# ACCOMMODATION OF BICYCLES ON MARC TRAINS

# MARYLAND DEPARTMENT OF TRANSPORTATION MASS TRANSIT ADMINISTRATION

**DRAFT**
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***- Revised -***


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# *EXECUTIVE SUMMARY*

## *STUDY BACKGROUND AND PURPOSE*

The Maryland Mass Transit Administration (MTA) currently allows bicycles on Light Rail and Metro Subway lines with great success. However, its commuter rail (MARC) system currently serving destinations on three rail lines does not permit bicycles (unless folded and in a case) because of safety concerns.

To address this situation, MTA has undertaken a feasibility study to identify a safe and efficient method to accommodate bicycles on MARC trains. The three key areas for consideration are:

1. Modification of the MARC vehicles to safely secure bicycles during transport
2. Bicycle access while boarding and detraining at the various station types
3. Schedule of when bicycle access can be permitted

The report is organized into the following sections, which are briefly described in this Executive Summary:

- MTA's current bicycle policies
- Other Transit Agency Policies and Procedures
- Typical Bicycle Dimensions
- Vehicle Feasibility Study
- Station Feasibility Study

## *MTA MARC SERVICE*

MTA provides MARC Train Service through contracts with the National Passenger Railroad Corporation (Amtrak) and CSX Transportation, Inc. (CSX). For Amtrak-operated passenger trains, the bicycle policy varies depending on the service. No information was available concerning CSX's policy regarding bicycles.

## *VEHICLE FEASIBILITY STUDY*

The Vehicle Feasibility Study evaluated methods of securing bicycles on the various types of MARC vehicles with two primary objectives:

- The safety of passengers, both during regular operations and in the case of an emergency, by ensuring that Federal Railroad Administration safety procedures and regulations are met
- Minimizing the impacts to passengers and seat availability

A common restraint mechanism found on "Bike on Board" Programs is the **vertical rack**. Offering safety and convenience while maximizing storage space, the vertical rack has few drawbacks. Although the cost may be slightly higher than its horizontal counterpart, the vertical rack is complete, self-contained and offers fast placement and removal of bicycles.

Several transit agencies, particularly when their trains have a higher volume or specific destination for multiple bicycle patrons, provide a **separate storage car** or luggage car for bicycles (the bicyclist would leave the bicycles in this car and move to a passenger car during the trip). This option requires that a separate car be provided for each train, adding additional operational costs and loading time, but allowing for the complete separation of passengers and bicycles.

Currently, MARC operates MARC II and MARC III (bi-level) rail vehicles on all three rail lines (Brunswick, Camden, and Penn). This feasibility study includes accommodating bicycles on both types of vehicles.

The options recommended are as follows:

- MARC II Cab Cars – Option 5, two vertical racks with security walls
- MARC II Elderly/Disabled Cars – Option 5, two vertical racks with security walls
- MARC II Passenger Cars – Option 1, two vertical racks with security walls
- MARC III Passenger Cars – Option 1, horizontal rack with security wall

To ensure that a minimum of two bicycles are accommodated by each train set in operation, a range of options are available. These options are:

**Minimum**
**Implementation Option A**

MARC II Cab Cars (17)
MARC II Elderly/Disabled Cars (9)
MARC III Passenger Cars (26)
***Total of 52 Cars***

**Maximum**
**Implementation Option B**

MARC II Cab Cars (17)
MARC II Elderly/Disabled Cars (9)
MARC II Passenger Cars (34)
MARC III Passenger Cars (26)
***Total of 86 Cars***

The cost for implementing both options is included in the following table:

***Table 7 Implementation Option Costs***

| Vehicle Type | Option | Number of Cars | Total Seats Lost | Cost per Car | Total |
|---|---|---|---|---|---|
| **Option A** | | | | | |
| MARC II Cab Cars | 5 | 17 | 102 | $4,300 | $73,100 |
| MARC II Elderly/Disabled Cars | 5 | 9 | 54 | $4,300 | $38,700 |
| MARC III Passenger | 1 | 26 | 78 | $5,000 | $130,000 |
| ***Totals Option A*** | | 52 | 234 | ***Total Cost Option A*** | $241,800 |
| **Option B** | | | | | |
| MARC II Cab Cars | 5 | 17 | 102 | $4,300 | $73,100 |
| MARC II Elderly/Disabled Cars | 5 | 9 | 54 | $4,300 | $38,700 |
| MARC II Passenger Cars | 1 | 34 | 204 | $4,300 | $146,200 |
| MARC III Passenger | 1 | 26 | 78 | $5,000 | $130,000 |
| ***Totals Option B*** | | 86 | 438 | ***Total Cost Option B*** | $388,000 |

## *STATION FEASIBILITY STUDY*

The Station Feasibility Study included an investigation of the configurations of MARC stations, and the implications for bicycle access to and from the trains. In addition, a field test was conducted to identify issues associated with boarding and detraining MARC vehicles at various stations.

The issues vary depending on the type of platform at the station, low with step box, low or high. A low with step box platform is where the platform is below the top of the rail. A low platform is located at around the same height as the rail. A high level platform is 4 feet above rail.

Amtrak's current position would be to allow bicycle access at all low-level and high-level platforms. **Appendix B** includes a letter from Amtrak on its position concerning bicycle access.

Only two stations on the CSX Camden Line have high-level platforms: Camden and Greenbelt; and two stations, St. Denis and College Park, have low-level step box platforms. The CSX Brunswick Line, however, has all but two stations, Duffields and Brunswick (low-level), with low-level step box platforms. In the future, Rockville and New Silver Spring stations will have low-level platforms without step boxes. CSX has indicated that it would allow bicycle access at all Brunswick and Camden Line stations.

## *RECOMMENDATIONS*

Based on the information developed in this report, MTA will develop a pilot program to accommodate bicycles on MARC trains. After retrofit, a test for a one-year period will accommodate bicycles on trains operating on the Penn, Camden, and Brunswick Lines.

It is recommended that a partial retrofit of the MARC vehicles be undertaken to secure bicycles. The goal is to ensure that at least one car on each train be retrofitted for securing bicycles. In addition, station stops would need to be coordinated to ensure that the transit vehicle carrying bicycles stop at the platform for each station, thus eliminating the potential for the changing positioning of trains.

# ACCOMMODATION OF BICYCLES ON MARC TRAINS

# ON MARC TRAINS

## I. INTRODUCTION

The Maryland Mass Transit Administration (MTA) currently allows bicycles on Light Rail and Metro Subway lines with great success. However, its commuter rail (MARC) system currently serving destinations on three rail lines does not permit bicycles (unless folded and in a case) because of safety concerns.

To address this situation, MTA has undertaken a feasibility study to identify a safe and efficient method to accommodate bicycles on MARC trains. The three key areas for consideration are:

1. Modification of the MARC vehicles to safely secure bicycles during transport
2. Bicycle access while boarding and detraining at the various station types
3. Schedule of when bicycle access can be permitted

## II. PROJECT OVERVIEW

According to a recent user survey, the Washington Metrorail System provided transportation for over 1,500 passengers with bicycles over a 15-day period. Some transit systems, particularly in California, handle as many as 2,000 bicycles daily. However, the MTA's MARC Train Service currently serving destinations on three rail lines in Maryland and the greater Washington D.C. area, does not permit bicycles on MARC trains because of safety concerns.

In order for bicyclists to be accommodated on MARC trains, a procedure to ensure the safety for all passengers and employees must be identified. In addition, it is important bicycles be brought on board without inconveniencing other passengers. Procedures and techniques to accommodate bicycles on MARC trains in a safe and efficient manner, while minimizing the impact to other passengers needs to be evaluated. The type of transit vehicles to be modified, method of accommodation, and cost are all important factors in facilitating bicycles on MARC trains.

## *III. MTA BICYCLE POLICY*

MTA provides MARC Train Service through contracts with the National Passenger Railroad Corporation (Amtrak) and CSX Transportation, Inc. (CSX). For Amtrak-operated passenger trains, the bicycle policy varies depending on the service. CSX's policy is to allow folded bicycles carred in a case. MTA's policy is described below:

- Bicycles are allowed on Light Rail and Metro Subway during all operating hours, excluding two hours before and after an event at Oriole Park at Camden Yards.

- No more than two bicycles are permitted per transit vehicle.

- A bicycle is considered a conventional two-wheel vehicle, not longer than 72 inches, higher than 48 inches or wider than 22 inches. Motor powered bicycles, tandem bicycles, motorcycles, mopeds, tricycles and bicycles with trailers or training wheels are not allowed.

- Always be considerate of other passengers. Wait until exiting and entering passengers have cleared the doorway before carrying the bicycle onto the vehicle. When moving your bicycle, protect the safety of other passengers.

- You must be 18 years of age with proof of age or accompanied by an adult who is 18 years of age. Only one bicycle per person.

- Place your bicycle in the area reserved for seniors and people with disabilities. Seniors and people with disabilities have priority over bicycles. Hold your bicycle at all times and keep it out of the way of other passengers. Should you need to relinquish your seat, please move your bicycle to another reserved seating area. If the other seats are occupied, you will need to exit the vehicle and wait for the next available vehicle.

- The bicycle must be clean and free of sharp objects.

- You may not ride your bicycle on the train, in the station or on the platform areas. Never take a bicycle on the escalators.

commuter trains.

- The MTA does permit folded bicycles (bicycles in which the frame folds and the wheels come together) and dismantled bicycles enclosed in suitable carrying cases on all MTA services.

- The bicyclist assumes all responsibility and liability for all injury, loss and/or damage involving his/her bicycle when brought into station.

MTA also provides, for a rental fee, bicycle lockers at seven Metro Subway stations and one MARC station. Also, bicycle racks are provided at most stations. A permit is not required for use of Metro or Light Rail by bicyclists.

## *IV. OTHER TRANSIT AGENCY POLICIES AND PROCEDURES*

Bicycles have been permitted successfully on transit services across the nation. The following examples identify the type of service, policy issues, and types of devices used for securing the bicycles. Examples range from separate cars for bicycles to the use of bungee cords to secure the bicycles. All commuter rail operations researched, except CalTrain and VRE, do not permit bicycles on peak-period, peak-direction trains. A summary of these examples is included at the end of this section in **Table 1**. In addition, Amtrak's bicycle policy is described at the end of this section.

### A. New Jersey Transit

The New Jersey Transit "Bike Aboard Program" allows bicyclists to board off-peak and weekend trains with a standard frame bicycle. Off-peak hours run from 9:30 a.m. to 4:00 p.m. and 7:00 p.m. to 5:00 a.m. Bicyclists are required to be at least 16 years old, and possess a permit, which is available free of charge at customer service windows. Two bicycles are allowed on each American Disability Act (ADA) accessible car (normally one car per train). The bikes are secured to a metal rail (**Figure 1**) with two user-supplied bungee cords not less than 24 inches in length. Riders must have both a permit and bungee cords in order to board the train. Bicyclists must yield space to persons with disabilities. Failure to comply with regulations may result in permit revocation.

made optional by New Jersey Transit. If tiedowns are not used, the cyclist is required to remain with the bicycle and steady it. In addition, a permit is no longer required in order to bring a bicycle aboard a New Jersey Transit train.

Bicycles are transported at the owner's risk. New Jersey Transit is not responsible for bicycles that are lost, stolen, or damaged. If the bicycle is considered by a New Jersey Transit employee to pose a hazard to the safety of other passengers due to overcrowded trains or other operating conditions, the employee may prohibit the bicycle. Cyclists must be able to lift their bicycles up and down stairs while boarding and detraining, or while gaining access to station platforms.

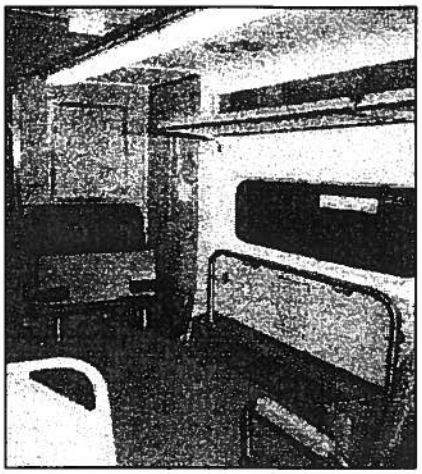


**Figure 1: NJ Transit Comet III Car with Horizontal Rack Located in Designated Handicapped Area**

## B. Massachusetts Bay Transportation Authority (MBTA)

MBTA requires the purchase of a $5.00 bicycle permit, valid for three years. In obtaining the permit, bicyclists must sign a statement agreeing to the rules and regulations established by the MBTA. The permit holder must also sign a waiver indemnifying and releasing the MBTA from "all injury, loss, and/or damage involving any bicycle brought into the station areas and aboard trains." Bicycles are prohibited from MBTA commuter trains during the weekday morning and evening rush hours (indicated on MBTA schedules). Bicycles are permitted all day on weekends. The MBTA schedule indicates specifically on which trains bikes

are allowed on each commuter rail train.

MBTA information indicates that 1.1 million riders a day use MBTA transit and thousands of permits had been issued. Commuter trains are operated by Amtrak, under contract to MBTA on lines not owned by Amtrak. There is no tie or lock down system in place, and the trains have not been modified in any way to provide special accommodation to bicyclists. The bicycles must be clean, kickstands up, and under the control of the owner at all times. Chief complaints generated by traditional users include coming into contact with a dirty bike and/or bicyclists not waiting for other riders before boarding/leaving trains. Bicycle and handicap (ADA) spaces are segregated, so bicycle and wheelchair users do not conflict on the train. Bicycles are generally boarded on the last car.

### C. Long Island Rail Road (LIRR)

LIRR operates heavy commuter rail on 11 branches, serving Long Island, New York. Trains and tracks are owned and operated by the LIRR. Bicycle policy varies with time of day and time of year. Bicyclists are primarily vacationers destined for the Hamptons rather than commuters destined for Manhattan.

The LIRR requires bicycle users to obtain a permit from LIRR authorities. The permit is non-transferable and releases the LIRR from any liability of injury, death or damages arising from the use of the permit and places sole liability on the permittee for any injury, death or damages arising from the use of the permit. The permit is also valid on Metro North commuter rail serving Connecticut. Permit applications are available at Penn Station for a one-time fee of $5.00. Up to two bicycles may be stored in the ADA area on the diesel fleet. On the existing Electric M series cars, storage is limited to two bicycles per car, and the bicycles are to be stowed between the three-seater rows in the car. Permit holders must possess a bungee cord, for use in securing their bicycle. Bicycles are currently placed in the vestibule of passenger cars. No specially designed racks or hookups are in place. On weekdays, each train will accommodate a total of four bicycles, two in the east car and two in the west car. On weekends, a maximum of eight bicycles are allowed on LIRR trains, with one allowed on each car. Special weekend "bicycle trains" operate to Montauk and accommodate more than the officially permitted number of bicycles. Trains to the Hamptons in the summer are full, limiting bikes to one of four

rush.

### D. Metro North Commuter Railroad Company (MNCRC)

Permit holders are permitted to board MNCRC during off-peak hours or non-holiday weekdays. No restrictions are in place on non-holiday weekends. On weekdays, two bicycles are permitted per car, with a total of four bicycles allowed on each train. On weekends, the number of bicycles allowed increases to eight. Bicycles are placed in the two rear cars of inbound (to Grand Central Terminal) and the front cars of outbound trains, unless directed to other cars by the crew. Bicycles are secured in areas designated by the train's crew. The owner must stay with the bicycle in order to keep the bicycle secure so it does not pose a hazard to other riders.

### E. Southeastern Pennsylvania Transit Authority (SEPTA) Regional Rail

Bicyclists may board all SEPTA trains without a special permit during off-peak weekday and weekend hours. Bicyclists board at doors identified by handicap or bicycle decals and occupy the wheelchair area, when empty. Each car can carry two bicycles on weekdays and five bicycles on weekends, at the discretion of the conductor. There are no special fixtures in place for securing bicycles. SEPTA will make arrangements to accommodate large groups. SEPTA trains are owned and operated by the transit authority. **Figure 2** shows a sample of SEPTA's instructoins for its "Bikes on Board" program.

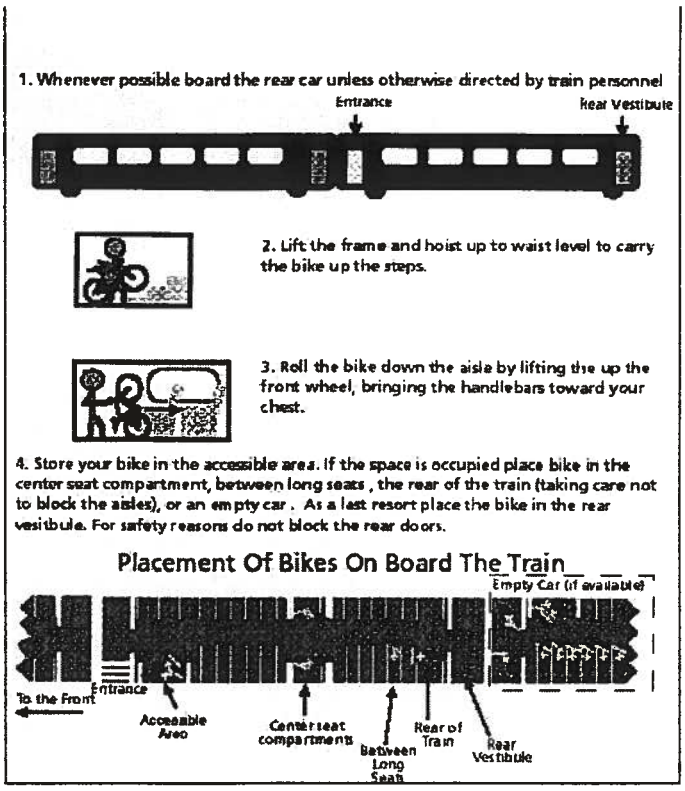



**Figure 2: Posted Diagram and Instructions for SEPTA "Bikes On Board" Program**

## F. CalTrain

CalTrain provides transit service to over 2,000 bicyclists daily. Trains accept 24 bikes per train minimum, 48 maximum if two bicycle cars are provided. The pilot program, started in 1982, allowed two bikes per car, held by the rider. During the pilot program, CalTrain paid Southern Pacific additional liability premiums to indemnify the carrier from additional liability. The additional coverage came at a cost of over $100.00 per bicycle passenger. In 1992, CalTrain was purchased by the Peninsula Corridor Joint Powers Board and contracted operations to AMTRAK. Recent modifications resulted in removal of 12 seats in each train's cab car and the installation of six bicycle racks, enough to accommodate 24 bikes (**Figure 3**). A few peak trains have a maximum of two cab cars with bike racks and these cars are marked by decals. All bike racks have bungee cords to tie around the bikes. Detailed instructions are posted at the station and inside each cab-car instructing riders how to load bicycles onto the train. Trains are

maintenance is supported by an active bicycle lobby/community in the Bay Area.

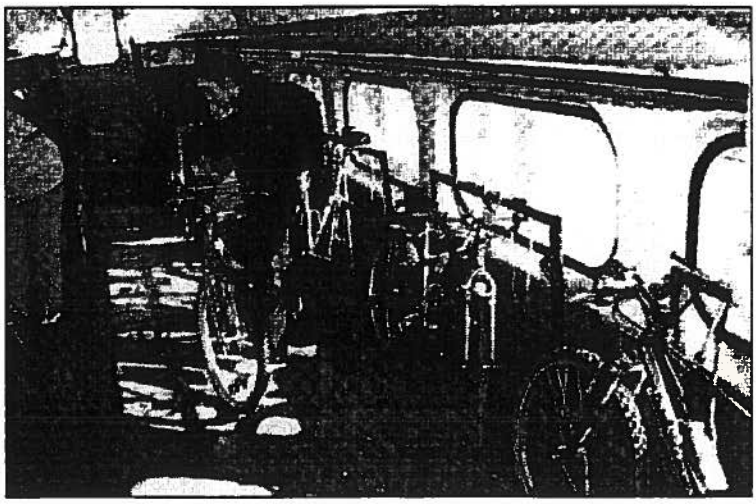


**Figure 3: Northern California's CalTrain Equipped with Horizontal Racks and Bungee Cord Restraints**

After the installation of bicycle racks, CalTrain encountered problems with the delay of trains caused by excess shuffling when a bike had to be removed by the exiting passenger. To resolve this, destination tags were placed on bikes and experienced CalTrain riders work together to remove the bikes from the train. An increasing demand for bicycle accommodations has caused some bicyclists to be denied entry onto the train when capacity is exceeded.

### G. Virginia Railway Express (VRE)

On VRE trains, bikes are only allowed in the Café Car. Only two trains on each line have Café Cars, and usage by bicyclists is very low. However, VRE is currently considering elimination of Café Cars and bicycles due to increased ridership and the need to provide more seating without adding to layover storage needs. In the current configuration, bikes are attached under tables in the Café Cars with Velcro straps (provided). Full size, regular bicycles are allowed on Café Cars. Amtrak personnel operate VRE, but equipment is owned by VRE. VRE trains operate on CSX and Norfolk Southern tracks.

On Amtrak passenger trains, the bicycle policy varies depending on where the service is being provided. Some routes, including the Vermonter and Piedmont, have accommodations for unboxed bicycles. For a small handling fee ($5.00), conductors will affix a bicycle to vertical racks in the baggage area in a non-passenger car. The bikes are situated in a herringbone fashion at a 35-degree angle. This method takes up less space than placing bikes perpendicular to the wall and makes it easier to move the bikes in and out of the modules. Each train has one baggage car equipped with 20 lockable bicycle parking and security modules. If racks are not available, AMTRAK will accept boxed bicycles for stowage in the baggage compartment. AMTRAK "California Cars" operating in Southern California have upright accommodation for three bicycles per car (**Figure 4**). The California Cars utilize a vertical bike rack system manufactured by Bomar Industries of Indianapolis.

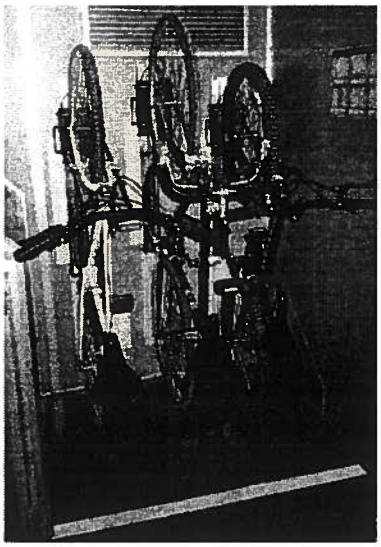


**Figure 4: Three Bikes Racked Vertically on a Bomar "Easy Rack," Applied to a "California Car" Serving Southern California**

## Table 1: Summary of Commuter Transit Bicycle Policies

| Area | System | Permit Required | Cost / Expires | Age Restrictions | Time Restrictions | Number of Bikes | Tie Down Procedure and Location on Train | ADA | Frequency of Service |
|---|---|---|---|---|---|---|---|---|---|
| ***New Jersey*** | NJ Transit | No | Free with fare | 16 and older | Service available Weekdays from 9:30 a.m. to 4 p.m. and 7 p.m. to 5 a.m., all day on Weekends | 2 / train | Two bungee cords (user supplied) used to attach bike to fixture in designated area. If tiedowns are not used, the cyclist is required to remain with the bicycle and steady it. | Bikes must be moved to avoid conflict | 5 to 10 minutes during peak hours, 10 to 15 minutes during off peak hours |
| ***Boston*** | MBTA | Yes | $5.00 / 3 years | 12 and older, 12-15 must be accompanied by adult | Available at all times except for Weekday peak hours | 4 / train | No tie down procedure, location of bikes is designated by the conductor | No conflict | 15 minutes between stations |
| ***Long Island*** | LIRR | Yes | $5.00 / one time | None | Service available Weekdays 10 a.m. to 3 p.m. and after 8 p.m., and Weekends 10 a.m. to 4 p.m. and after 6 p.m. | 2 / car (MU), 3 / car (diesel) | No tie down procedure, bikes are to be held by passengers in the designated section | Conflict on Diesel fleet only, bikes must be moved for the disabled | 20 to 30 minutes during peak hours, 30 minutes to 1 hour during off peak hours |
| ***New York / Conn.*** | Metro North | Yes | $5.00 / one time | None | Service available Weekdays 10 a.m. to 3 p.m. and after 8 p.m., and Weekends 10 a.m. to 4 p.m. and all times after 6 p.m. | 2 / car, 4 / train (8 / train weekends) | No tie down procedure, bikes are to be held by passengers in the designated section | No conflict | 15 to 20 minutes during peak hours, 20 to 30 minutes during off peak hours |
| ***Philadelphia*** | SEPTA | No | Free with fare | None | Service available only during off peak hours | 2 / car | No tie down, bikes stored in handicapped area or between long seats, and center seat compartments | Bikes must be moved to avoid conflict | 5 to 10 minutes during peak hours, 10 to 15 minutes during off peak hours |
| ***San Francisco*** | Caltrain | No | Free with fare | 16 and older | Service available during all operating hours | 24 / car, max. two cars | Horizontal tie down with bungee to wall racks | No conflict | 5 to 10 minutes during peak hours, 10 to 15 minutes during off peak hours |
| ***Northern Virginia*** | VRE | No | Free with fare | None | Service only when café car is available | 6 / train | Two velcro straps provided by VRE. One strap to the front of the bicycle frame under the handle bar, one to the rear of the frame and stored at a table in café car. | No conflict | 5 to 10 minutes during peak hours, 10 to 15 minutes during off peak hours, depending on the availability of Café Cars |

To ensure that the current MTA bicycle policy meets the size requirements for bicycles and for the development of options, the following information was obtained from manufacturers and retailers. All dimensions are based on average model bicycles. Adult Mountain bicycles range in frame size from 17 inches to 22 inches with wheelbases of 55 inches to 71 inches, respectively. Children's bicycles generally range from 9 to 13 inch frames with respective wheelbases of 40 inches and 59 inches.

## A. Adult Mountain Bicycles

- Frame Size (length from center of pedal crank to seat connector): 20"
- Wheelbase (distance between front and rear wheel): 70"
- Seat Height ( distance from ground): 41"
- Handlebar Height (distance from ground to handle bar): 43"
- Handlebar Width: 24.5"
- Diameter of Wheel: 26"
- Width of Inflated Tire: 2"
- Pedal Width: 14"

## B. Children's Bicycles

- Frame Size (length from center of pedal crank to seat connector): 11"
- Wheelbase (distance between front and rear wheel): 52"
- Seat Height ( distance from ground): 26"
- Handlebar Height (distance from ground to handle bar): 35"
- Handlebar Width: 25"
- Diameter of Wheel: 18"
- Width of Inflated Tire: 1.5"
- Pedal Width: 12"

Based upon this information, the design options considered for the MARC trains follow the current MTA bicycle policy with one exception. The allowable bicycle width has been increased to 26 inches from 22 inches, in order to accommodate the handlebar width of an

of 25 inches and also adult mountain bikes which average 24.5 inches.

## *VI. VEHICLE FEASIBILITY STUDY*

A Vehicle Feasibility Study was done as part of this report. The study evaluated methods of securing bicycles on the various types of MARC vehicles. Evaluation criteria were applied to each technique with emphasis on passenger safety. In order to accommodate bicycles on MARC trains, an understanding of the types of transit vehicles and the normal operation of these vehicles was necessary. Several options for securing bicycles and the cost for implementation were developed for the different types of MARC vehicles.

### A. Bicycle Racking Techniques

The securing methods for evaluation have been grouped into four categories of techniques for MTA trains:

- No Required Restraint
- Horizontal Rack
- Vertical Rack
- Separate Storage Car

A description of each of these techniques is provided in this section.

#### 1. No Required Restraint of Bicycle

A policy of **no required restraint** for bicycles would require the owner to hold onto the bike throughout the duration of the trip. This unsecured option is primarily used on light rail systems or metro rail systems where speeds are lower and strict FRA safety rules do not apply. The bicycle would have to be held in an area away from the aisles and doors, most often in a handicapped accessible area. This alternative is the most convenient for loading and unloading.

Another technique for restraining bicycles is to provide a **horizontal rack** (or bar) to rest the bicycle against and a restraint mechanism to secure the bicycle with. Either MTA or the owner of the bicycle would be responsible for supplying the restraint mechanism. Examples of restraint mechanisms include bungee cords, Velcro straps, locks or other tie down systems. A crossbar or rack would be necessary to secure the bike in either an angled or parallel position. The horizontal rack could be available in a handicapped or otherwise designated area. Horizontal racks sometimes stack bicycles up to three deep, resulting in inconvenience and delays when departing the train. Such a design alternative is now in use on the New Jersey Transit Comet III car as well as the Caltrain in Northern California.

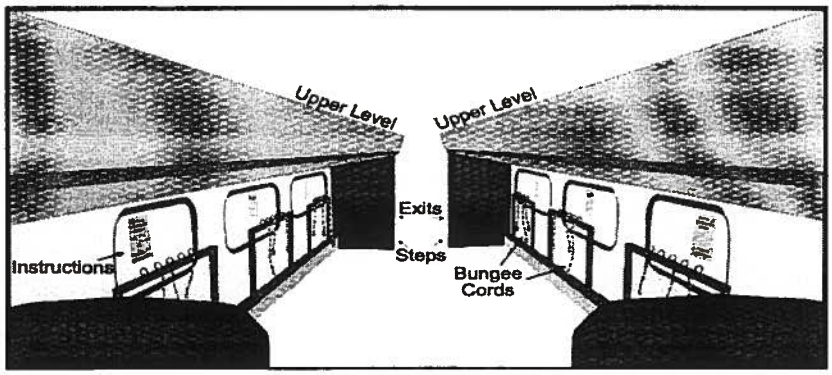



**Figure 5: Detailed Example of Horizontal Racks Retrofitted in a Caltrain Cab Car**

### 3. Vertical Rack

The most common restraint mechanism found on "Bike on Board" Programs is the **vertical rack**. Offering safety and convenience while maximizing storage space, the vertical rack has few drawbacks. This rack holds the bicycle by placing the front wheel over a hook, while holding the rear wheel between two restraint bars located on the floor. The rear wheel restraint bars restrict the bicycle from moving from side to side during travel. Although the cost may be slightly higher than its horizontal counterpart, the vertical rack is complete and self-contained and offers fast placement and removal of bicycles.

**Figure 6: Example of Bike Track's Mini Mum Wall-It--2X--MHV Vertical Rack**

### 4. Separate Storage Car

Some trains such as LIRR and Amtrak with a higher volume or specific destination for multiple bicycle patrons, provide a **separate storage car** or luggage car. This option requires that a separate car be available for each train, adding additional operational costs. The need for an entire storage car would only have to be introduced in accordance with demand. This option allows for the complete separation of passenger and bike. Additional time is required per stop for the loading of bicycles and the return of riders to the passenger cars.

The methods of securing bicycles were evaluated with two primary objectives:

- The safety of passengers and crews, both during operation and in the case of an emergency, by ensuring that Federal Railroad Administration safety procedures and regulations are met
- Minimizing the impacts to passengers and the availability of seats

**1. Safety**

Based on the positive experience in cities across the Nation, problems with safety surrounding the many bicycle-on-transit services have been overcome for many transit operations. Policies to address safety have been developed for transit systems providing the bicycle services. The following is a list of some common general policies:

- Bicycles are to be boarded last
- Keep bicycles out of aisles and away from doors
- Use elevators, not escalators, while in the station
- No riding of the bicycle while in station or on train
- Keep bicycles clean of dirt and grease
- Any detachable items (water bottles, air pumps, etc.) should be removed prior to boarding

Signs with these rules are placed in prominent locations in stations to notify bicycle-on-rail travelers of safety regulations. In addition, some transit systems require a permit with a signed waiver relieving the agency of any liability. In many transit systems minors are either prohibited from bringing bicycles on board unless accompanied by an adult or must have a parent or legal guardian's signature before a permit is granted.

With concerns associated with liability, the Study Team solicited input from the Transit Insurance Group about the liability issue of bicycles on MARC trains. Since MTA is self insured for the first $5 million, it is unlikely to be an insurance cost issue. A representative from

the Transit Insurance Group is checking with other transit agencies concerning their experience with bicycles on trains.

### 2. Federal Railroad Administration (FRA) Safety Requirements

The FRA states in its Passenger Equipment Safety Standards (49 CFR Part 223) that a minimum of four window exits, one located at each end of each side of a passenger coach, shall operate as emergency exits. Furthermore, if the coach is bi-level, four windows, one located at each end of each side on each level, shall operate as emergency exits. The size of the passenger coach sealed window emergency exits shall have a minimum free opening of 30 inches wide by 30 inches high. These requirements must be taken under consideration in the event that the bike rack or the bicycles themselves may interfere with any emergency exits.

### 3. Seating Capacity

The provision of a bicycle storage area in the cars reduces the number of passenger seats. The impact of seating loss varies by alternative, and the acceptable degree of this impact is an important consideration in the selection of the preferred alternative. Special bike storage areas will adversely affect very crowded conditions on Penn Line rush hour trains. The removal of seats will provide extra storage area for luggage on trains serving BWI Airport. As ridership increases, the loss of seats may require adding cars to trains, increasing the need for additional equipment layover facilities, as well as additional rail cars.

## C. MARC Vehicle Types

Currently, MARC operates MARC II and MARC III (bi-level) rail vehicles on all three rail lines (Brunswick, Camden, and Penn). This feasibility study includes accommodating bicycles on both types of vehicles. Cab cars, Elderly/Disabled and Passenger cars can be defined as follows:

**Cab Cars**

- only one passenger entrance
- other entrance for operator
- restroom facilities
- wheelchair lockdown area

**Elderly/Disabled Cars**

- two entrances
- restroom facilities
- wheelchair lockdown area

**Passenger Cars**

- two entrances
- no restroom facilities

Both the MARC II and MARC III transit vehicles have different configurations based upon use. **Table 2** identifies the number of vehicles by type:

**TABLE 2**
**NUMBER AND TYPES OF MARC VEHICLES**

| Vehicle Type | No. of Vehicles | No. of Seats/Car |
|---|---|---|
| MARC II Cab Car | 17 | 107 |
| MARC II Trailer | 34 | 121 |
| MARC II Elderly/Disabled | 9 | 107 |
| MARC III Cab Car | 10 | 128 |
| MARC III Passenger | 26 | 131 |
| MARC III Elderly/Disabled | 7 | 128 |
| MARC III Snack Car | 7 | 129 |

## D. MARC Transit Vehicle Options

The following options have been identified for consideration based on the various types of MARC vehicles. Figures for each option are included in **Appendix A**, and a matrix comparing alternatives is included at the end of this section.

### 1. MARC II Cab, Elderly/Disabled, and Passenger Cars

MTA's MARC II vehicle fleet currently has 17 Cab Cars, nine Elderly/Handicap Cars and 34 Passenger (Trailer) Cars in service. The wheelchair access area for both the Cab Cars and Elderly/Disabled Cars is identical. Therefore, the options developed for accommodating bicycles are the same for both the MARC II Cab Cars and Elderly/Handicap Cars.

#### a. MARC II Cab and Elderly/Disabled Cars - Option 1

This option considers use of a horizontal rack to accommodate two bicycles as shown in **Figure A-1**. The rack would be located next to the current wheelchair lockdown area. In order to provide enough area for the bicycles without blocking the emergency door release panel located next to the wheelchair lockdown area, two flip-up seats would need to be removed. In addition, to provide additional space, the regular seats immediately behind the flip-up seats should be replaced with flip-up seats. Under this option, bicycles would not be permitted when a wheelchair patron is utilizing the lockdown area. In addition, many concerns such as weak cords

and the potential for working loose, have been identified with the need for a bungee cord, Velcro strap or other restraining device for the horizontal rack. Based on these concerns, this option is not recommended, but is shown as a potential option.

### b. *MARC II Cab and Elderly/Disabled Cars - Option 2*

Option 2 would replace the horizontal rack identified in Option 1 with two vertical racks as shown in **Figure A-2**. By using vertical racks, only two flip-up seats would need to be removed. This option provides easy access to the bicycle racks while providing a more secure lockdown procedure. As in Option 1, under this option bicycles would not be permitted when a wheelchair patron is utilizing the lockdown area. However, if only one bicycle rack is in use, a wheelchair patron may be accommodated, but is not desirable since this would isolate the handicap patron from the rest of the riders.

### c. *MARC II Cab and Elderly/Disabled Cars - Option 3*

This option proposes placing two vertical racks against the outside of the bathroom wall as shown in **Figure A-3**. In order to accommodate the bicycles, a set of three regular seats would need to be removed. In addition, to provide access to the bicycles, the three regular seats directly behind the bicycle racks would need to be replaced with flip-up seats. A wheelchair lockdown device is optional and could be placed under the flip-up seat closest to the window. This will allow for use by additional wheelchair patrons when the bicycle racks are not in use. Because these racks are located across from the existing wheelchair lockdown area, both bicycles and wheelchair patrons may ride within the vehicle at the same time. However, while the bicycle rack is in use, one of the emergency access windows is partially blocked. This, however, does not raise a safety concern since most, if not all, of the windows on that side are equipped as emergency exit windows.

### d. *MARC II Cab and Elderly/Disabled Cars - Option 4*

This option proposes the placement of two vertical racks located over the window behind the bathroom as shown in **Figure A-4**. As with Option 3, this option would require the removal of three regular seats and the replacement of three regular seats with flip-up seats. A wheelchair lockdown device is optional and could be placed under the flip-up seat providing an extra location for use while the bicycle racks are not being used. This option provides greater

access for securing the bicycle than in Option 3; however, the bicycle racks may interfere with the emergency exit window even when not in use. However, other emergency access windows are easily accessible on the same side of the train meeting FRA regulations.

With a minor modification to Option 4, a small padded wall may be added to help protect passengers who choose to sit in the seats directly behind the bicycles. This wall may add additional protection in the event of an accident. Additional studies prior to implementation may be necessary to identify the type and exact location of the wall.

#### e. *MARC II Cab and Elderly/Disabled Car - Option 5*

In order to provide the greatest safety to passengers in the event of an accident, this option proposes that the bicycle racks and bicycles be placed in a separate partitioned storage area. Option 5, as shown in **Figure A-5,** is similar to Option 4 but has a separate storage area placed around the bicycle rack. Under this option, a total of six passenger seats would be removed in order to accommodate the storage area. The storage area must be located so as to permit access to the overhead HVAC compartments.

### 2. *MARC II Passenger (Trailer) Car - Option 1*

Taking into consideration the option developed for the MARC II Cab Cars, this option closely follows the MARC II Cab Car Option 5. In order to provide the greatest safety to passengers in the event of an accident, this option proposes that the bicycle racks and bicycles be placed in a separate partitioned storage area. This option proposes the placement of two vertical racks located over the window directly behind the double seats prior to the beginning at the triple seats in the "B" end of the vehicle as shown on **Figure A-6**. This option would require the removal of 2 sets of triple seats for a total of six lost passenger seats. The storage area must be located so as to permit access to the overhead HVAC compartments.

### 3. MARC III Bi-Level Cab Car

Options available for bicycle placement on these vehicles is limited. Access to the emergency windows, the location of the bathroom, access to the emergency door release panel and passenger movement between the upper and lower levels present many restrictions to the potential locations for bicycle accommodation.

### a. *MARC III Cab - Option 1*

Option 1 proposed placing a single bicycle rack on the back of the bathroom wall as shown in **Figure A-7**. Due to the spacing requirements, only one bicycle may be accommodated under this option. In addition, it is recommended that a wheelchair lockdown device be added to the other set of flip-up chairs, across from the existing wheelchair lockdown device. This would permit simultaneous use by both a bicycle patron and a wheelchair patron. This option, however, blocks the only emergency window on the side of the train with the bicycle. FRA regulations require one emergency exit window per side per level. Therefore, this option has been dropped from consideration.

### b. *MARC III Cab - Option 2*

In order to prevent the blockage of the emergency window, Option 2 proposes the placement of a bicycle rack situated at an angle of 45 degrees in the corner opposite the existing wheelchair lockdown device as shown in **Figure A-8**. This option would require the loss of two passenger seats. By placing the rack at a 45-degree angle, access is still provided to the emergency door panel. However, this option partially blocks the aisle, causing a point of conflict with passengers boarding or exiting the vehicle. Due to the partial aisle blockage this option is not recommended for consideration.

### c. *MARC III Cab – Option 3*

To provide a greater degree of safety, Option 3 introduces the placement of a padded wall to provide additional protection in the event of an accident as shown in **Figure A-9**. However, with the padded wall, access to the emergency door release panel is blocked; therefore, this option is not recommended for consideration.

## 4. MARC III Bi-Level Passenger Car

### a. *MARC III Passenger - Option 1*

Option 1 proposes the placement of a horizontal rack located next to the stairs for the upper level of the vehicle as shown in **Figure A-10**. This option would require the removal of

enclosed area for the bicycles. It is suggested that the remaining seatback be raised to provide additional protection for passengers on this level. The shelving units currently located beside the stairs could serve as a storage area for accessories belonging to bicycle patrons. For the MARC II vehicles, the horizontal rack was dropped from consideration based upon the lockdown procedure. In this option, however, because of the partially enclosed area in which the bicycles will be located, a horizontal rack is still an option.

### b. *MARC III Passenger - Option 2*

Option 2 proposes the same location as Option 1; however, the horizontal rack is replaced with two vertical racks as shown in **Figure A-11**. Two passenger seats are still removed for this option. In addition, it is recommended that the remaining seatback be raised or will be added to provide additional protection from the bicycles in the event of an accident. While this option is possible, this option is slightly less desirable due to the potential for interference with the stairs to the second level.

Under both options for the MARC III Passenger Cars, the addition of a wheelchair lockdown device across from the existing device is recommended. While not necessary for the bicycle accommodation options, this would allow for use by two wheelchair patrons at all times.

### c. *MARC III Elderly/Disabled and Snack Cars*

During the options development for each of the MARC vehicle types, consideration was given for use of the MARC III Elderly/Disabled and Snack Cars. Just as with the MARC III Bi-Level Cab Car, options available for bicycle placement is limited. Due to the lack of viable options and that these vehicles would be combined in a train set in which other vehicles are equipped to accommodate bicycles, no options are presented for the MARC III Elderly/Disabled or Snack Cars. It is not recommended that the MARC III Elderly/Disabled or Snack Cars be retrofit to accommodate bicycles.

The options matrix shown in **Tables 3 and 4** has been developed to highlight some of the evaluation criteria for each option. Included with each option is a cost per vehicle. Detailed information concerning the cost estimates is included in the next section of this feasibility study.

## Table 3 - MARC II Bicycle Accommodation Options

| Option | Description | Net Passengers Seats | | Number of Bicycles | Wheelchair Lockdowns | Both Bicycle and Handicap Accom. | Blocks Emergency Window | Cost per Vehicle | Number of Vehicles | Cost per Fleet | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Removed | Installed | | | | | | | | |
| Cab and Elderly/Disabled 1 | Horizontal Bicycle Rack<br>Located near existing handicap lockdown | 2 Flip-up Seats<br>2 Regular Seats | 2 Flip-up Seats | 2 | 1 | 1 Wheelchair<br>or<br>2 Bicycles | No | $1,900.00 | 17<br>9 | $32,300.00<br>$17,100.00 | Horizontal Rack Lockdown Device<br>Not Acceptable<br>Not Recommended for Consideration |
| Cab and Elderly/Disabled 2 | Vertical Bicycle Lockdown<br>Located near existing handicap lockdown | 2 Flip-up Seats | 0 | 2 | 1 | 1 Wheelchair<br>or<br>2 Bicycles | No | $2,500.00 | 17<br>9 | $42,500.00<br>$22,500.00 | Tends to isolate hadicap person |
| Cab and Elderly/Disabled 3 | Vertical Bicycle Lockdown<br>Located on back of bathroom wall across from current handicap lockdown | 6 Regular Seats | 3 Flip-up Seats | 2 | 2 | 1 Wheelchair<br>2 Bicycles<br>or<br>2 Wheelcharis<br>0 Bicycles | Yes<br>When bicycles are in racks | $6,800.00 | 17<br>9 | $115,600.00<br>$61,200.00 | Blocks Emergency Window<br>(not blocked when 0 bicycles) |
| Cab and Elderly/Disabled 4 | Vertical Bicycle Lockdown<br>Located over window directly behind bathroom across from current handicap lockdown | 6 Regular Seats | 3 Flip-up Seats | 2 | 2 | 1 Wheelchair<br>2 Bicycles<br>or<br>2 Wheelchairs<br>0 Bicycles | Yes<br>Possibility only when bicycles are in racks | $6,800.00 | 17<br>9 | $115,600.00<br>$61,200.00 | Blocks Emergency Window |
| Cab and Elderly/Disabled 5 | Vertical Bicycle Lockdown<br>with Enclosed Cabinet<br>Located over window directly behind bathroom across from current handicap lockdown | 6 Regular Seats | 0 | 2 | 1 | 1 Wheelchair<br>2 Bicycles | Yes | $4,300.00 | 17<br>9 | $73,100.00<br>$38,700.00 | Blocks Emergency Window<br>Bicycles can be in an Enclosed Area |
| Passenger 1 | Vertical Bicycle Lockdown<br>with Enclosed Cabinet<br>Located over window directly behind double seats at the beginning of the triple seats | 6 Regular Seats | 0 | 2 | 0 | 2 Bicycles | Yes | $4,300.00 | 34 | $146,200.00 | Blocks Emergency Window<br>Bicycles can be in an Enclosed Area |

## Table 4 - MARC III Bicycle Accommodation Options

| Option | Description | Net Passengers Seats Removed | Net Passengers Seats Installed | Number of Bicycles | Wheelchair Lockdowns | Both Bicycle and Handicap Accom. | Blocks Emergency Window | Cost per Vehicle | Number of Vehciles | Cost per Fleet | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cab 1 | Vertical Bicycle Lockdown Located on bathroom wall in handicap lockdown area | 1 Flip-up Seat | 0 | 1 | 2 | 1 Wheelchair or 1 Bicycle | Yes | $4,900.00 | 10 | $49,000.00 | Blocks Only Emergency Exit Window Not Recommended for Consideration |
| Cab 2 | Vertical Bicycle Lockdown Located in corner across from handicap lockdown | 2 Flip-up Seats | 0 | 1 | 1 | 1 Wheelchair 1 Bicycle | No | $1,300.00 | 10 | $13,000.00 | Partial Block of Emergency Release Door Extends Into Aisle Not Recommended for Consideration |
| Cab 3 | Vertical Bicycle Lockdown Located in corner across from handicap lockdown | 2 Flip-up Seats | 0 | 1 | 1 | 1 Wheelchair 1 Bicycle | No | $3,000.00 | 10 | $30,000.00 | Blocks Emergency Door Release Extends into Aisle Not Recommended for Consideration Bicycles can be in an Enclosed Area |
| Passenger 1 | Horizontal Bicycle Lockdown Located near storage area next to existing handicap lockdown area | 2 Flip-up Seats 1 Regular Seat | 0 | 2 | 2 | 2 Wheelchair 2 Bicycles | No | $5,000.00 | 26 | $130,000.00 | Bicycles can be in an Enclosed Area |
| Passenger 2 | Vertical Bicycle Lockdown Located near storage area next to existing handicap lockdown area | 2 Flip-up Seats 1 Regular Seat | 0 | 2 | 2 | 2 Wheelchair 2 Bicycles | No | $6,200.00 | 26 | $161,200.00 | Bicycles can be in an Enclosed Area |

## Table 5 - Bicycle Accommodation Options Cost per Car

| | | | | MARC II | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Cab and Elderly/Disabled | | | | | | | | | | Passenger | |
| | | | | Option 1 | | Option 2 | | Option 3 | | Option 4 | | Option 5 | | Option 1 | |
| | | | | Number | Cost | Number | Cost | Number | Cost | Number | Cost | Number | Cost | Number | Cost |
| | Material | Labor | Total | | | | | | | | | | | | |
| **SEATS** | | | | | | | | | | | | | | | |
| **Removal** | | | | | | | | | | | | | | | |
| Single Seat | NA | $45 | $ 45.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| Flip-up Single Seat | NA | $45 | $ 45.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| Double Seat | NA | $45 | $ 45.00 | 1 | $ 45.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| Flip-up Double Seat | NA | $45 | $ 45.00 | 1 | $ 45.00 | 1 | $ 45.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| Triple Seat | NA | $45 | $ 45.00 | 0 | $ - | 0 | $ - | 2 | $ 90.00 | 2 | $ 90.00 | 2 | $ 90.00 | 2 | $ 90.00 |
| Flip-up Triple Seat | NA | $45 | $ 45.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| **Replacement** | | | | | | | | | | | | | | | |
| Single Seat | $50 | $368 | $ 418.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| Flip-up Single Seat | $50 | $368 | $ 418.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| Double Seat | $50 | $368 | $ 418.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| Flip-up Double Seat | $50 | $368 | $ 418.00 | 1 | $ 418.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| Triple Seat | $50 | $368 | $ 418.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| Flip-up Triple Seat | $75 | $368 | $ 443.00 | 0 | $ - | 0 | $ - | 1 | $ 443.00 | 1 | $ 443.00 | 0 | $ - | 0 | $ - |
| **WHEELCHAIR LOCK-DOWN** | | | | | | | | | | | | | | | |
| Removal | NA | $23 | $ 23.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| Addition (optional) | $2,750 | $45 | $ 2,795.00 | 0 | $ - | 0 | $ - | 1 | $ 2,795.00 | 1 | $ 2,795.00 | 0 | $ - | 0 | $ - |
| **BICYCLE HOLD-DOWNS** | | | | | | | | | | | | | | | |
| Horizontal | $200 | $736 | $ 936.00 | 1 | $ 936.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| Vertical | $200 | $736 | $ 936.00 | 0 | $ - | 2 | $ 1,872.00 | 2 | $ 1,872.00 | 2 | $ 1,872.00 | 2 | $ 1,872.00 | 2 | $ 1,872.00 |
| **CABINET OR DIVIDER WALL** | $1,000 | $368 | $ 1,368.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 1 | $ 1,368.00 | 1 | $ 1,368.00 |
| | | | Total Estimated Cost | | $ 1,444.00 | | $ 1,917.00 | | $ 5,200.00 | | $ 5,200.00 | | $ 3,330.00 | | $ 3,330.00 |
| | | | With 30% Contingency | | $ 1,877.20 | | $ 2,492.10 | | $ 6,760.00 | | $ 6,760.00 | | $ 4,329.00 | | $ 4,329.00 |

**NA - Not Applicable**

Note: Labor costs based upon time to perform task at a $40/hr unburdened rate with 130% overhead added
Material costs for seat removal and replacement and wheelchair lock-down based of estimates received from MARC

## Table 5 - Bicycle Accommodation Options Cost per Car

| | | | | MARC III | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | CAB | | | | | | Passenger | | | |
| | | | | Option 1 | | Option 2 | | Option 3 | | Option 1 | | Option 2 | |
| | | | | Number | Cost | Number | Cost | Number | Cost | Number | Cost | Number | Cost |
| | Material | Labor | Total | | | | | | | | | | |
| **SEATS** | | | | | | | | | | | | | |
| **Removal** | | | | | | | | | | | | | |
| Single Seat | NA | $45 | $ 45.00 | 1 | $ 45.00 | 0 | $ - | 0 | $ - | 1 | $ 45.00 | 1 | $ 45.00 |
| Flip-up Single Seat | NA | $45 | $ 45.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| Double Seat | NA | $45 | $ 45.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| Flip-up Double Seat | NA | $45 | $ 45.00 | 0 | $ - | 1 | $ 45.00 | 1 | $ 45.00 | 1 | $ 45.00 | 1 | $ 45.00 |
| Triple Seat | NA | $45 | $ 45.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| Flip-up Triple Seat | NA | $45 | $ 45.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| **Replacement** | | | | | | | | | | | | | |
| Single Seat | $50 | $368 | $ 418.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| Flip-up Single Seat | $50 | $368 | $ 418.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| Double Seat | $50 | $368 | $ 418.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| Flip-up Double Seat | $50 | $368 | $ 418.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| Triple Seat | $50 | $368 | $ 418.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| Flip-up Triple Seat | $75 | $368 | $ 443.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| **WHEELCHAIR LOCK-DOWN** | | | | | | | | | | | | | |
| **Removal** | NA | $23 | $ 23.00 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| **Addition (optional)** | $2,750 | $45 | $ 2,795.00 | 1 | $ 2,795.00 | 0 | $ - | 0 | $ - | 1 | $ 2,795.00 | 1 | $ 2,795.00 |
| **BICYCLE HOLD-DOWNS** | | | | | | | | | | | | | |
| Horizontal | $200 | $736 | $ 936.00 | 0 | $ - | 0 | $ - | 0 | $ - | 1 | $ 936.00 | 0 | $ - |
| Vertical | $200 | $736 | $ 936.00 | 1 | $ 936.00 | 1 | $ 936.00 | 1 | $ 936.00 | 0 | $ - | 2 | $ 1,872.00 |
| **CABINET OR DIVIDER WALL** | $1,000 | $368 | $ 1,368.00 | 0 | $ - | 0 | $ - | 1 | $ 1,368.00 | 0 | $ - | 0 | $ - |
| | | | Total Estimated Cost | | $ 3,776.00 | | $ 981.00 | | $ 2,349.00 | | $ 3,821.00 | | $ 4,757.00 |
| | | | With 30% Contingency | | $ 4,908.80 | | $ 1,275.30 | | $ 3,053.70 | | $ 4,967.30 | | $ 6,184.10 |

**NA - Not Applicable**

Note: Labor costs based upon time to perform task at a $40/hr unburdened rate with 130% overhead added
Material costs for seat removal and replacement and wheelchair lock-down based of estimates received from MARC

# Table 6 - Bicycle Accomodation Options Total Fleet Cost

| Vehicle Type | Number of Cars | Option | Cost per Car | Total |
|---|---|---|---|---|
| | | | | |
| MARC II Cab Car | 17 | 1 | $ 1,900.00 | $ 32,300.00 |
| | | 2 | $ 2,500.00 | $ 42,500.00 |
| | | 3 | $ 6,800.00 | $ 115,600.00 |
| | | 4 | $ 6,800.00 | $ 115,600.00 |
| | | 5 | $ 4,300.00 | $ 73,100.00 |
| | | | | |
| MARC II Elderly Disabled | 9 | 1 | $ 1,900.00 | $ 17,100.00 |
| | | 2 | $ 2,500.00 | $ 22,500.00 |
| | | 3 | $ 6,800.00 | $ 61,200.00 |
| | | 4 | $ 6,800.00 | $ 61,200.00 |
| | | 5 | $ 4,300.00 | $ 38,700.00 |
| | | | | |
| MARC II Passenger | 34 | 1 | $ 4,300.00 | $ 146,200.00 |
| | | | | |
| | | | | |
| MARC III Cab Cars | 10 | 1 | $ 4,900.00 | $ 49,000.00 |
| | | 2 | $ 1,300.00 | $ 13,000.00 |
| | | 3 | $ 3,000.00 | $ 30,000.00 |
| | | | | |
| MARC III Regular Passenger | 26 | 1 | $ 5,000.00 | $ 130,000.00 |
| | | 2 | $ 6,200.00 | $ 161,200.00 |
| | | | | |

## 1. Capital Costs

The following matrix identifies the cost per option considered in the previous section. These costs are estimated on a per car basis. A unit price and estimated person hours to complete each task is shown in **Table 5**.

To determine the entire cost per fleet, the number of vehicles per type are included in **Table 6**.

The information shown in **Tables 3 and 4** has been used to evaluate the cost associated with the options presented. The opportunity for more bicycles per train increase as more cars are retrofitted to accommodate bicycles. For example, if just the MARC II cab cars are retrofitted, only two bicycles per train may be permitted. However, if all the MARC II passenger cars are also modified, at minimum six bicycles may be accommodated with a minimum of three cars per train (two passenger and one cab car).

Other potential costs not included as part of this study may include:

- Signs indicating location information and rack use directions
- Advertisement and description of new services

## G. Summary and Recommendations

In identifying the method in which to accommodate bicycles on MARC trains, evaluation criteria were applied to the various securing techniques used by other transit agencies. These techniques described within this section are no restraint required, horizontal rack, vertical rack and separate storage car. Based on safety and operational constraints, no restraint and the separate storage car were eliminated from consideration.

Several options were developed for retrofitting the existing MARC vehicles, considering both the horizontal and vertical racks. Costs were developed for each option per vehicle and fleet. Using safety as the primary evaluation criteria, lockdown techniques and locations were identified for both the MARC II and MARC III transit vehicles.

The options recommended are as follows:

- MARC II Cab Cars – Option 5, two vertical racks with security walls
- MARC II Elderly/Disabled Cars – Option 5, two vertical racks with security walls
- MARC II Passenger Cars – Option 1, two vertical racks with security walls
- MARC III Passenger Cars – Option 1, horizontal rack with security wall

To ensure that a minimum of two bicycles are accommodated by each train set in operation, a range of options are available.

| **Minimum Implementation Option A** | **Maximum Implementation Option B** |
|---|---|
| MARC II Cab Cars (17) | MARC II Cab Cars (17) |
| MARC II Elderly/Disabled Cars (9) | MARC II Elderly/Disabled Cars (9) |
| MARC III Passenger Cars (26) | MARC II Passenger Cars (34) |
| ***Total of 52 Cars*** | MARC III Passenger Cars (26) |
| | ***Total of 86 Cars*** |

In an effort to minimize cost, minimize lost seating capacity and provide at least one car with bicycle racks on each train set, Option A was recommended. The cost for implementing both options is included in the following table:

***Table 7 Implementation Option Costs***

| Vehicle Type | Option | Number of Cars | Total Seats Lost | Cost per Car | Total |
|---|---|---|---|---|---|
| **Option A** | | | | | |
| MARC II Cab Cars | 5 | 17 | 102 | $4,300 | $73,100 |
| MARC II Elderly/Disabled Cars | 5 | 9 | 54 | $4,300 | $38,700 |
| MARC III Passenger | 1 | 26 | 78 | $5,000 | $130,000 |
| ***Totals Option A*** | | 52 | 234 | ***Total Cost Option A*** | $241,800 |
| **Option B** | | | | | |
| MARC II Cab Cars | 5 | 17 | 102 | $4,300 | $73,100 |
| MARC II Elderly/Disabled Cars | 5 | 9 | 54 | $4,300 | $38,700 |
| MARC II Passenger Cars | 1 | 34 | 204 | $4,300 | $146,200 |
| MARC III Passenger | 1 | 26 | 78 | $5,000 | $130,000 |
| ***Totals Option B*** | | 86 | 438 | ***Total Cost Option B*** | $388,000 |

The Station Feasibility Study included an investigation of the configurations of current MARC Stations and the implications for bicycle access to and from the trains. In addition, a field test was conducted to identify issues associated with the entering and exiting of MARC vehicles at various stations.

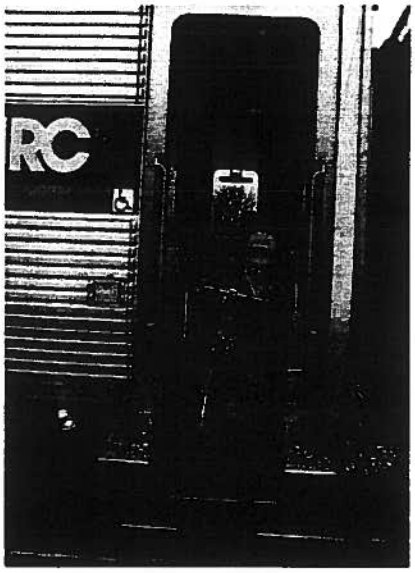



**Figure 7: Team Member Exiting MARC II Passenger Car with Bicycle**

## A. Existing Stations and Platforms

MARC operates transit service on three lines: the Penn Line, the Camden Line and the Brunswick Line. The three types of platforms that can be found at these stations include the following:

- **High-level:** the platform height is level with the transit vehicle floor and the customer can step directly into and out of the transit vehicle;
- **Low-level:** customers enter and exit at rail level using the transit vehicle steps; and
- **Low-level with step box:** the conductor places a metal step at the car entrance which customers use to step into and out of the transit vehicle.

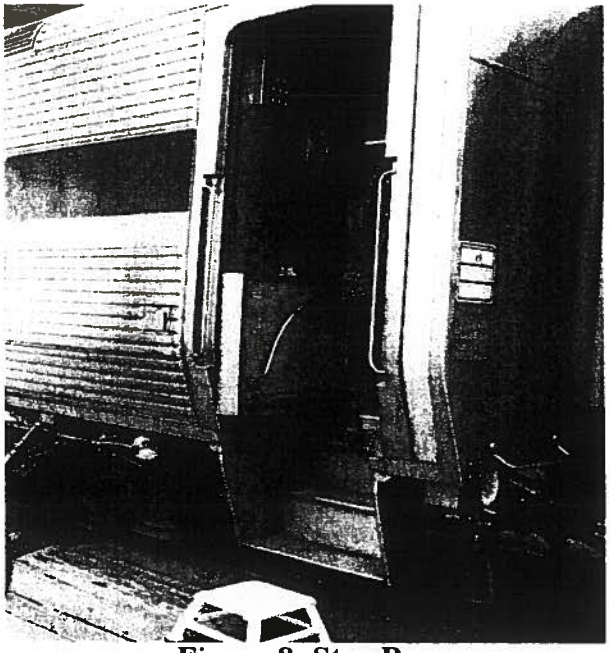


**Figure 8: Step Box**

A summary of the three MARC transit lines with station locations and types of platforms is included in **Table 8** below. **Figure 9** is a map of MARC Train Station locations.

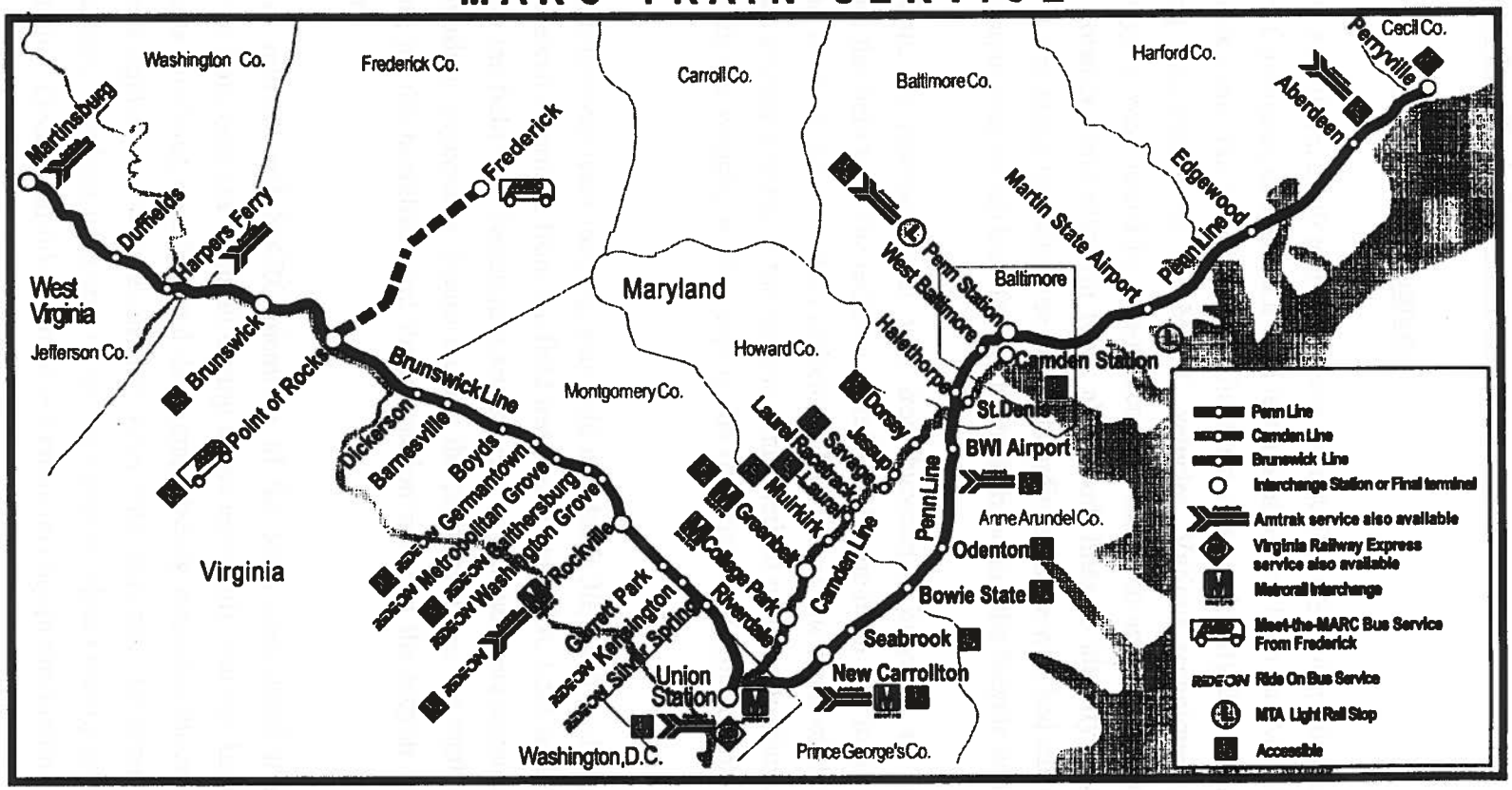
**Table 8 - MARC Stations**

| Amtrak Penn Line | |
|---|---|
| **Station** | **Platform** |
| Perryville | Low |
| Aberdeen | Low |
| Edgewood | Low |
| Martin Airport | Low/box |
| Penn Station | High/track #3 low |
| West Baltimore | Low/box |
| Halethorpe | Low/box |
| BWI | High |
| Odenton | High |
| Bowie State | High |
| Seabrook | High |
| New Carollton | High |
| Washington, DC | High/low |

| CSX Camden Line | |
|---|---|
| **Station** | **Platform** |
| Camden | High |
| St. Denis | Low/box |
| Dorsey | Low |
| Jessup | Low |
| Savage | Low |
| Laurel Racetrack | Low |
| Laurel | Low |
| Muirkirk | Low |
| Greenbelt | High |
| College Park | Low/box |
| Riverdale | Low |
| Washington, DC | High/low |

| CSX Brunswick Line | |
|---|---|
| **Station** | **Platform** |
| Martinsburg | Low/box |
| Duffields | Low |
| Harpers Ferry | Low/box |
| Brunswick | Low |
| Point of Rocks | Low/box |
| Dickerson | Low/box |
| Barnesville | Low/box |
| Boyds | Low/box |
| Germantown | Low/box |
| Metropolitan Grove | Low/box |
| Gaithersburg | Low/box |
| Washington Grove | Low/box |
| Rockville | Low/box |
| Garrett Park | Low/box |
| Kensington | Low/box |
| Silver Spring | Low/box |
| Washington, DC | High/low |
| Frederick | High |
| Frederick Suburban | High |

# MARC TRAIN SERVICE



When evaluating the stations, the key issues revolve around the type of platform. The team agreed that access to the high-level platforms was acceptable and did not pose a problem during the field test. Concerns of safety, however, varied among team members with respect to access to and from low-level and step box stations. At low level platforms, the major issue of concern is to ensure that bicycle patrons have the ability to use the handrail while boarding or exiting the vehicles. Amtrak is willing to permit bicycles on all high-level and low-level platforms for a pilot program and will make a final decision at a later time concerning low-level platforms with step boxes. CSX will permit bicycle access at all station platform types.

### C. Platform Length

Not all station platforms are the same length and the train is sometimes longer than the length of the available platform. In these situations, announcements are made for passengers to exit through certain cars. Boarding passengers are on the platform and enter adjacent cars. This could cause concern for a patron with a bicycle who wants to board or exit at a station where a bicycle car does not access the platform. In this case, the bicyclist would have to walk the bicycle through the train cars (impossible on trains with standees) or the train would have to shift its position along the track to allow access to the platform. Carrying a bicycle through bi-level cars also presents a hazard because of the stairs inside the cars. Likewise, if one of the bicycle storage areas are already full, the bicyclist would have to walk the bicycle through the train cars or the train would have to move its position to allow access to another car, or the bicycle patron would need to wait for the next train. Shifting the train's stopping location would require additional time at the station.

### D. Rush Hour Service

The interaction between transit riders and bicyclists is one of the leading criteria in the accommodation of bicyclists on MARC trains. Several factors influence the safety and flow of passengers served by MARC service; such as boarding and detraining, seating capacity, aisle space, and storage. The most critical need for passenger accommodation is during peak travel time or rush hour service. A potential conflict could exist if the train is full with passengers standing in the aisles when the train reaches a station with a bicycle patron. The bicycle patron would not have clear aisle space available to reach the bicycle hold down area. The reverse is also true if the bicycle patron wants to exit the train when the aisles are at capacity with standing passengers.

Specifically, AMTRAK has stated in their June 19, 2000 letter (**Appendix B**) that bicycles should not be carried on heavy rush hour trains. Similarly, during the investigation of other transit agencies in which bicycles were accommodated, several included restrictions for bicycle use during peak hour service or rush hour. Given the demand for service during rush hour, CSX has also expressed that bicycle accommodation should be limited during rush hour service.

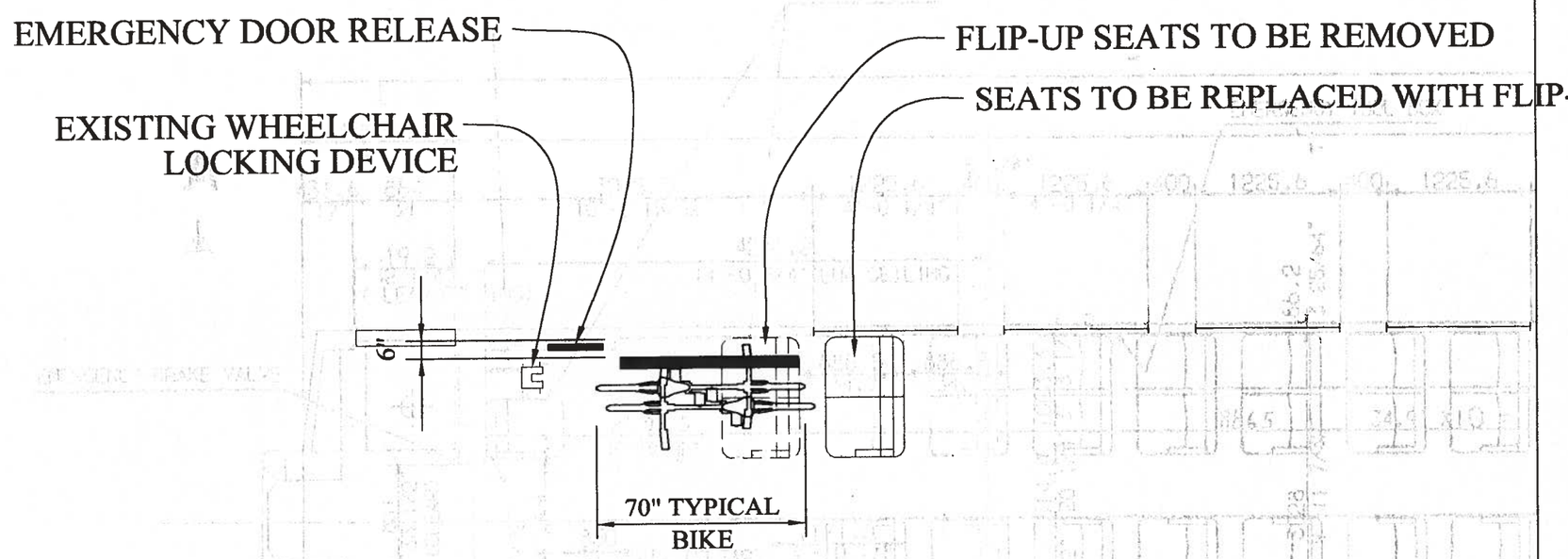
## E. Summary and Recommendation

Based on the information developed in this report, MTA will develop a pilot program to accommodate bicycles on MARC trains. After retrofit, a test for a one-year period will accommodate bicycles on trains operating on the Penn, Camden, and Brunswick Lines.

It is recommended that a partial retrofit of the MARC vehicles be undertaken to secure bicycles. The goal is to ensure that at least one car on each train be retrofitted for securing bicycles. In addition, station stops would need to be coordinated to ensure that the transit vehicle carrying bicycles stop at the platform for each station, thus eliminating the potential for the changing positioning of trains.

# APPENDIX A

# MARC TRANSIT VEHICLE OPTIONS




LEGEND

- WHEELCHAIR
- WHEELCHAIR LOCKING DEVICE
- BIKE MOUNTED VERTICALLY
- BIKE MOUNTED HORIZONTALLY
- FLIP-UP SEATS TO BE REMOVED
- SEATS TO BE REMOVED/REPLACED
- BOARDING LOCATION
- EMERGENCY DOOR RELEASE
- CAR WINDOW

# MARC II Cab and Elderly/Disabled Cars - Option 1

GRAPHIC SCALE

2 0 1 2 4

1 INCH = 4 FT.

**URS Greiner Woodward Clyde**
4 North Park Drive, Suite 200
Hunt Valley, MD 21030
Tel: 410.785.7220

MARYLAND MASS TRANSIT ADMINISTRATION
ACCOMMODATION OF BICYCLES ON MARC TRAINS
TRANSIT VEHICLE FEASIBILITY STUDY

MARC II Cab and Elderly/Disabled Cars - Option 1

| DATE: | SCALE: | FIGURE: |
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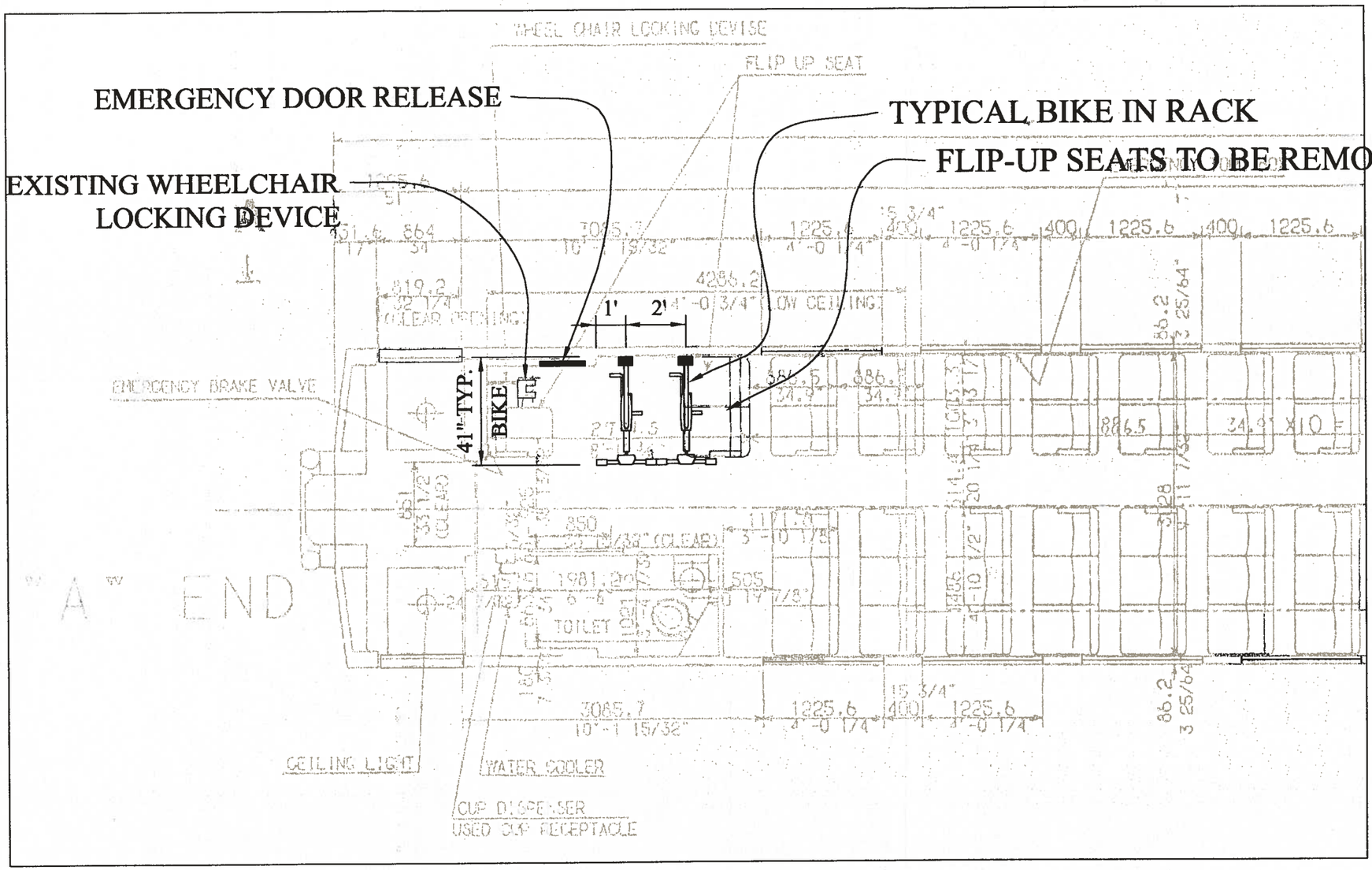


LEGEND

- WHEELCHAIR
- WHEELCHAIR LOCKING DEVICE
- BIKE MOUNTED VERTICALLY
- BIKE MOUNTED HORIZONTALLY
- FLIP-UP SEATS TO BE REMOVED
- SEATS TO BE REMOVED/REPLACED
- BOARDING LOCATION
- EMERGENCY DOOR RELEASE
- CAR WINDOW

# MARC II Cab and Elderly/Disabled Cars - Option 2

GRAPHIC SCALE

2 0 1 2 4

1 INCH = 4 FT.

**URS Greiner Woodward Clyde**
4 North Park Drive, Suite 200
Hunt Valley, MD 21030
Tel: 410.785.7220

MARYLAND MASS TRANSIT ADMINISTRATION
ACCOMMODATION OF BICYCLES ON MARC TRAINS
TRANSIT VEHICLE FEASIBILITY STUDY

MARC II Cab and Elderly/Disabled Cars - Option 2

| DATE: | SCALE: | FIGURE: |
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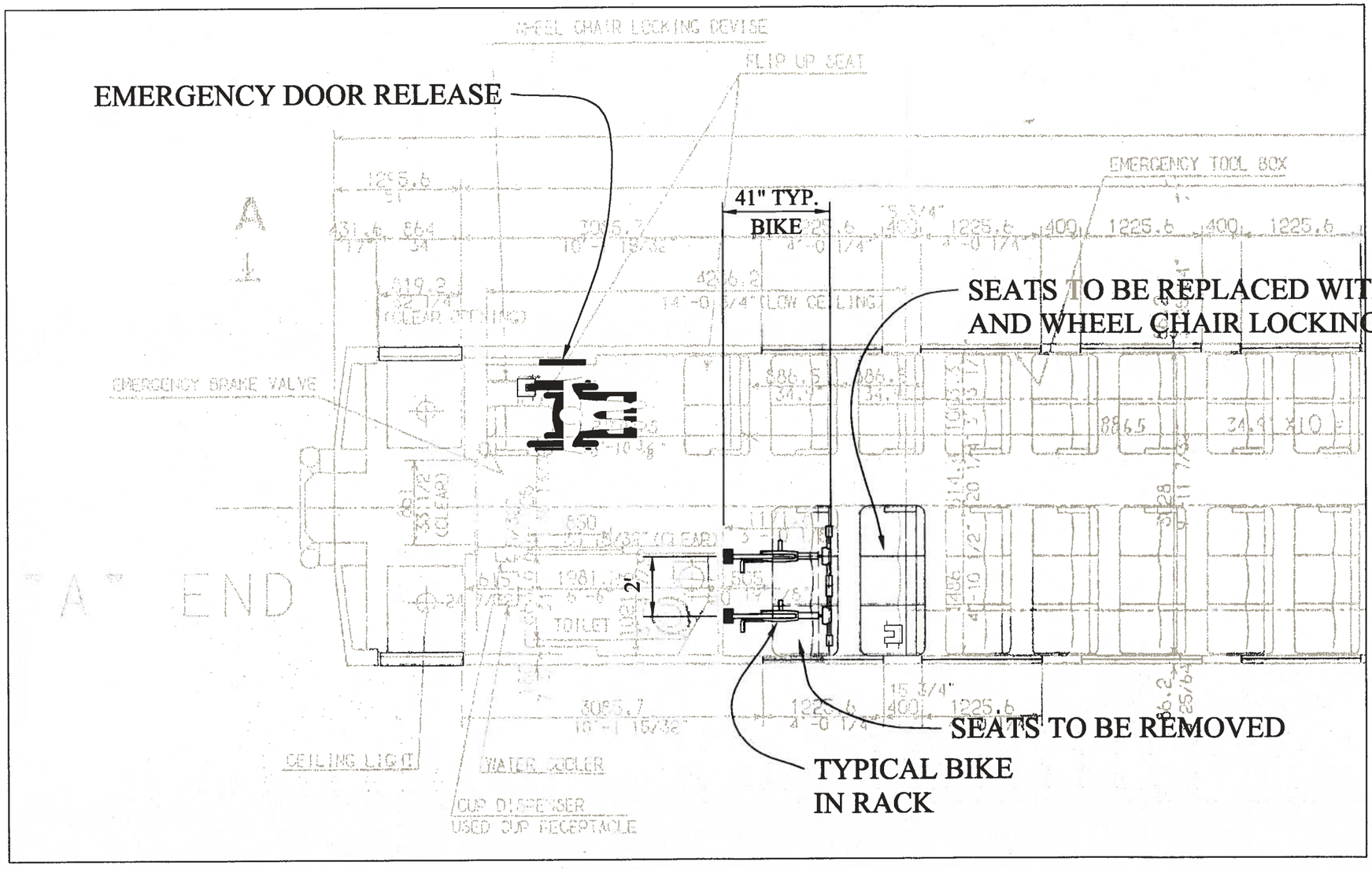


LEGEND

- WHEELCHAIR
- WHEELCHAIR LOCKING DEVICE
- BIKE MOUNTED VERTICALLY
- BIKE MOUNTED HORIZONTALLY
- FLIP-UP SEATS TO BE REMOVED
- SEATS TO BE REMOVED/REPLACED
- BOARDING LOCATION
- EMERGENCY DOOR RELEASE
- CAR WINDOW

# MARC II Cab and Elderly/Disabled Cars - Option 3

GRAPHIC SCALE

2 0 1 2 4

1 INCH = 4 FT.

**URS Greiner Woodward Clyde**
4 North Park Drive, Suite 200
Hunt Valley, MD 21030
Tel: 410.785.7220

MARYLAND MASS TRANSIT ADMINISTRATION
ACCOMMODATION OF BICYCLES ON MARC TRAINS
TRANSIT VEHICLE FEASIBILITY STUDY

MARC II Cab and Elderly/Disabled Cars - Option 3

| DATE: | SCALE: | FIGURE: |
|---|---|---|
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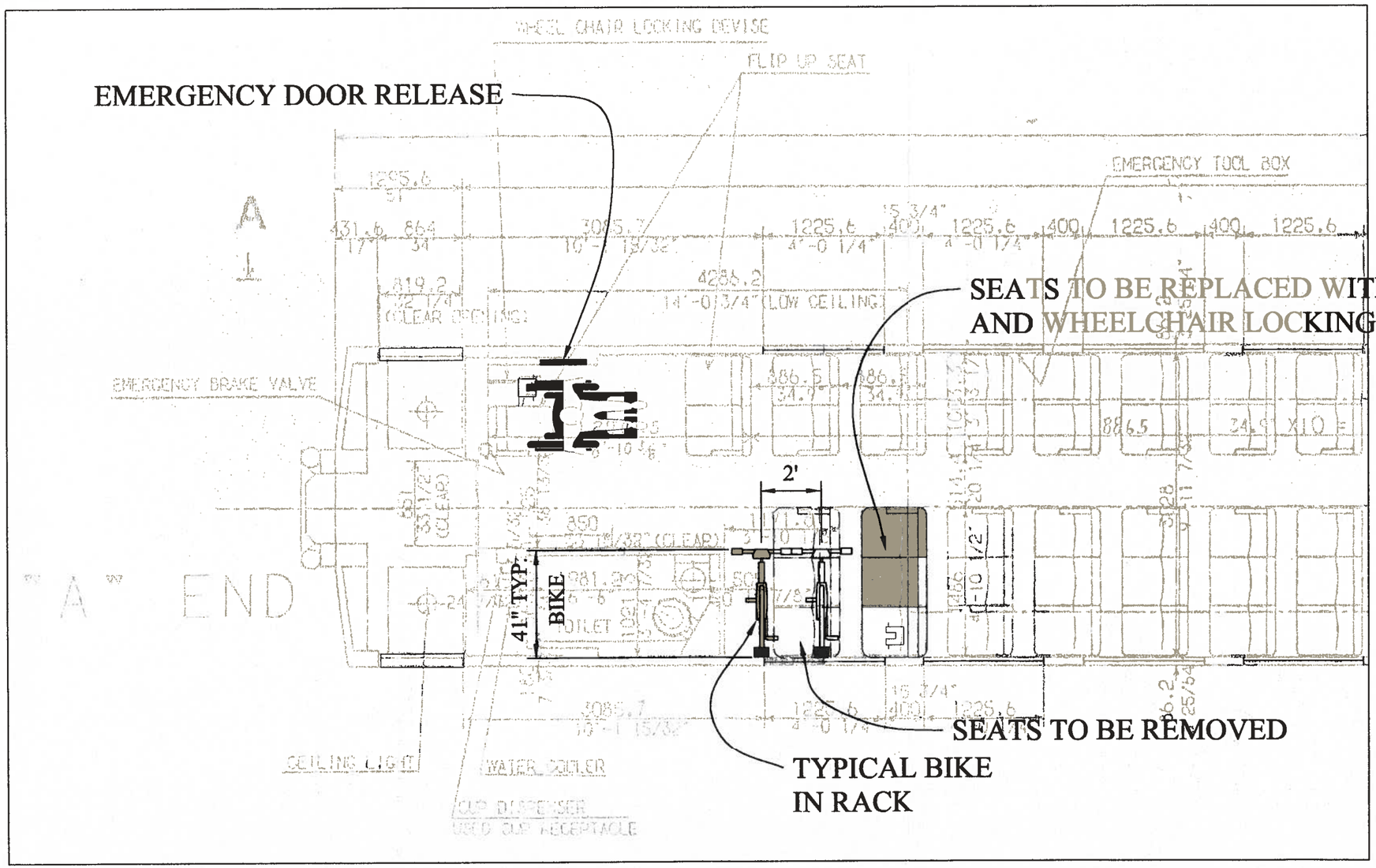


LEGEND

- WHEELCHAIR
- WHEELCHAIR LOCKING DEVICE
- BIKE MOUNTED VERTICALLY
- BIKE MOUNTED HORIZONTALLY
- FLIP-UP SEATS TO BE REMOVED
- SEATS TO BE REMOVED/REPLACED
- BOARDING LOCATION
- EMERGENCY DOOR RELEASE
- CAR WINDOW

# MARC II Cab and Elderly/Disabled Cars - Option 4

GRAPHIC SCALE
2 0 1 2 4
1 INCH = 4 FT.

**URS Greiner Woodward Clyde**
4 North Park Drive, Suite 200
Hunt Valley, MD 21030
Tel: 410.785.7220

MARYLAND MASS TRANSIT ADMINISTRATION
ACCOMMODATION OF BICYCLES ON MARC TRAINS
TRANSIT VEHICLE FEASIBILITY STUDY

MARC II Cab and Elderly/Disabled Cars - Option 4

| DATE: | SCALE: | FIGURE: |
|---|---|---|
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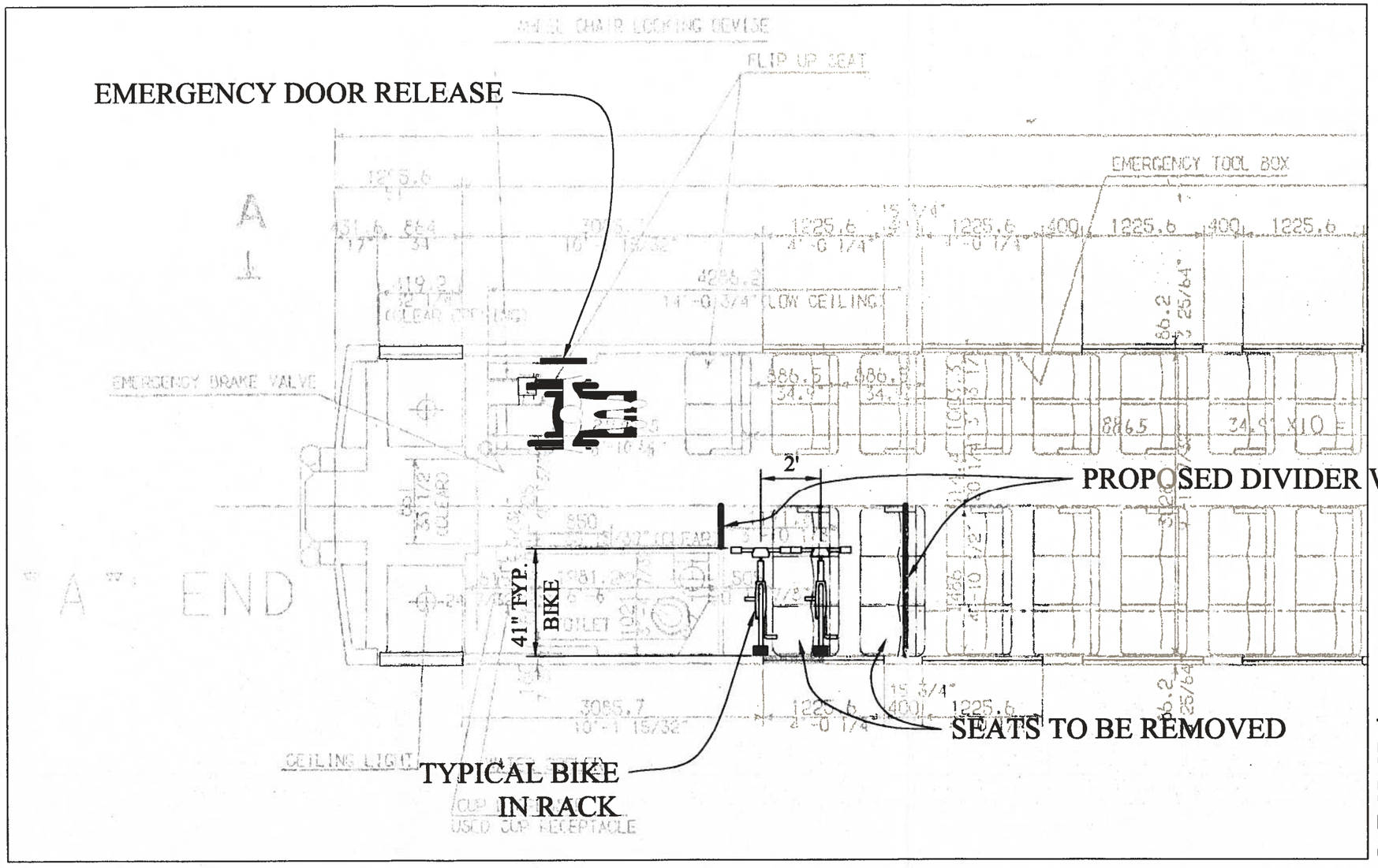


LEGEND

- WHEELCHAIR
- WHEELCHAIR LOCKING DEVICE
- BIKE MOUNTED VERTICALLY
- BIKE MOUNTED HORIZONTALLY
- FLIP-UP SEATS TO BE REMOVED
- SEATS TO BE REMOVED/REPLACED
- BOARDING LOCATION
- EMERGENCY DOOR RELEASE
- CAR WINDOW

# MARC II Cab and Elderly/Disabled Cars - Option 5

GRAPHIC SCALE

2 0 1 2 4

1 INCH = 4 FT.

**URS Greiner Woodward Clyde**
4 North Park Drive, Suite 200
Hunt Valley, MD 21030
Tel: 410.785.7220

MARYLAND MASS TRANSIT ADMINISTRATION
ACCOMMODATION OF BICYCLES ON MARC TRAINS
TRANSIT VEHICLE FEASIBILITY STUDY

MARC II Cab and Elderly/Disabled Cars - Option 5

| DATE: | SCALE: | FIGURE: |
|---|---|---|
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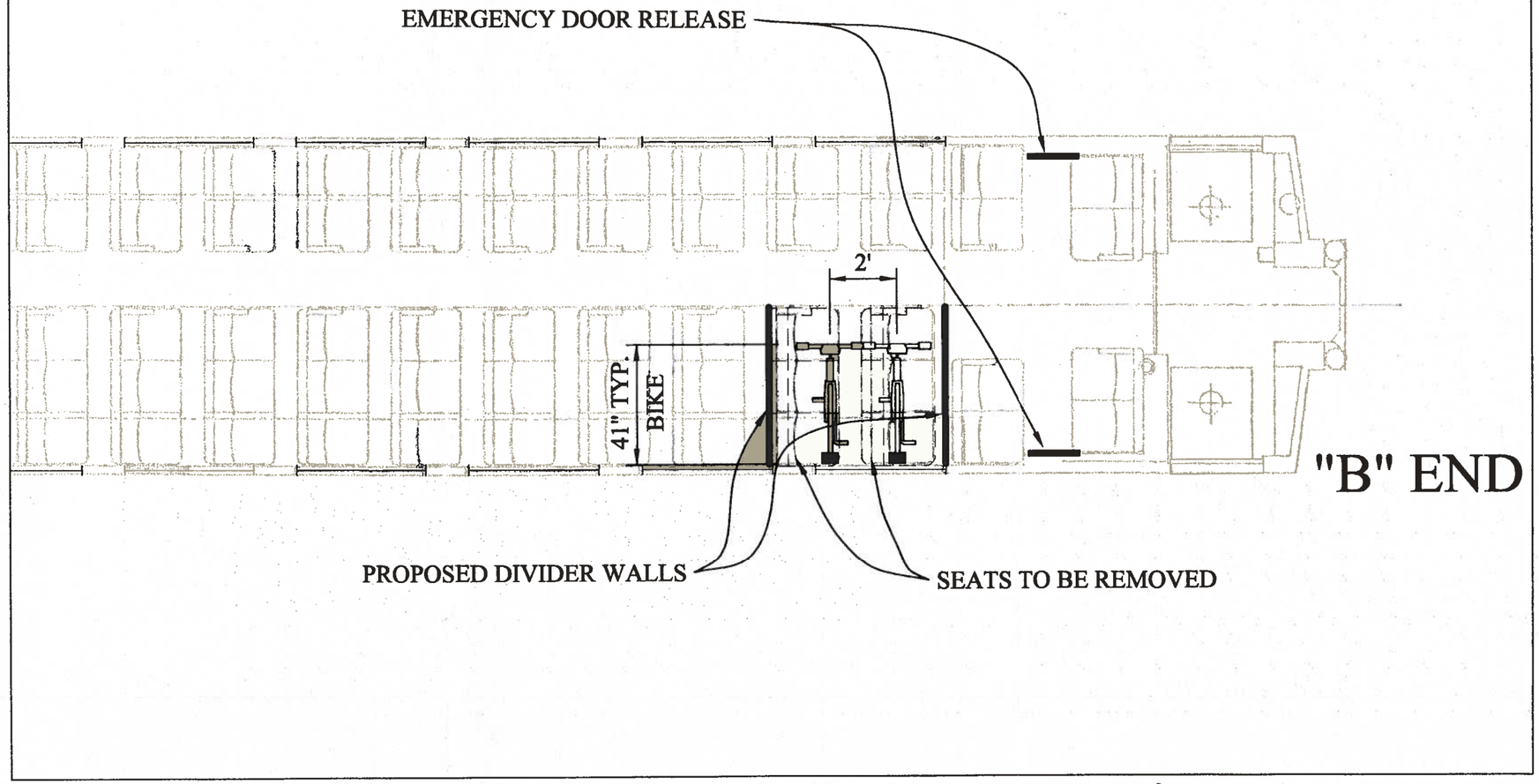


LEGEND

- WHEELCHAIR
- WHEELCHAIR LOCKING DEVICE
- BIKE MOUNTED VERTICALLY
- BIKE MOUNTED HORIZONTALLY
- FLIP-UP SEATS TO BE REMOVED
- SEATS TO BE REMOVED/REPLACED
- BOARDING LOCATION
- EMERGENCY DOOR RELEASE
- CAR WINDOW

# MARC II Passenger Car - Option 1

GRAPHIC SCALE

2 0 1 2 4

1 INCH = 4 FT.

**URS Greiner Woodward Clyde**
4 North Park Drive, Suite 200
Hunt Valley, MD 21030
Tel: 410.785.7220

MARYLAND MASS TRANSIT ADMINISTRATION
ACCOMMODATION OF BICYCLES ON MARC TRAINS
TRANSIT VEHICLE FEASIBILITY STUDY

MARC II Passenger Car - Option 1

| DATE: | SCALE: | FIGURE: |
|---|---|---|
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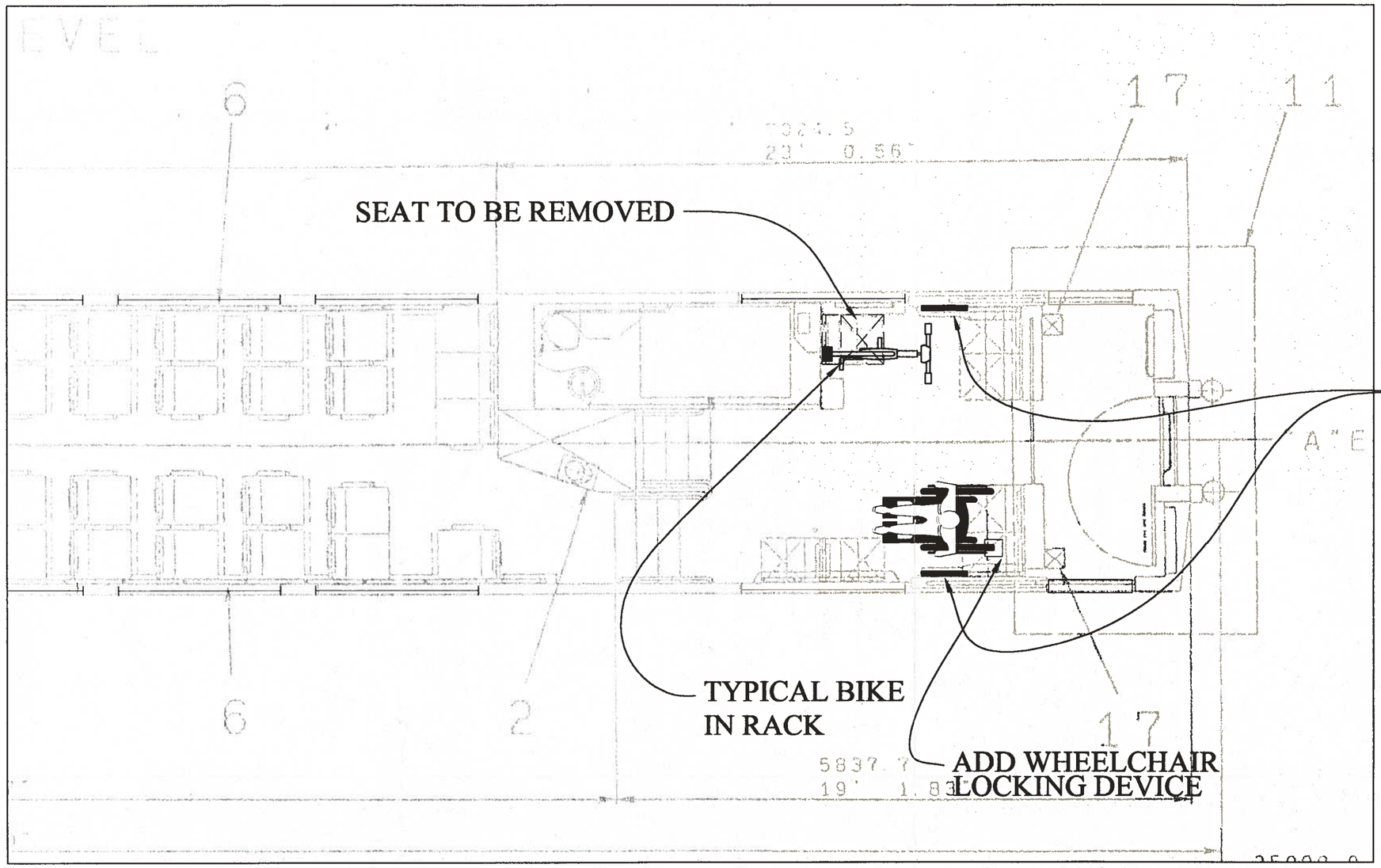


LEGEND

- WHEELCHAIR
- WHEELCHAIR LOCKING DEVICE
- BIKE MOUNTED VERTICALLY
- BIKE MOUNTED HORIZONTALLY
- FLIP-UP SEATS TO BE REMOVED
- SEATS TO BE REMOVED/REPLACED
- BOARDING LOCATION
- EMERGENCY DOOR RELEASE
- CAR WINDOW

# MARC III Cab Car - Option 1

URS Greiner Woodward Clyde
4 North Park Drive, Suite 200
Hunt Valley, MD 21030
Tel: 410.785.7220

MARYLAND MASS TRANSIT ADMINISTRATION
ACCOMMODATION OF BICYCLES ON MARC TRAINS
TRANSIT VEHICLE FEASIBILITY STUDY

MARC III Cab Car - Option 1

| DATE: | SCALE: | FIGURE: |
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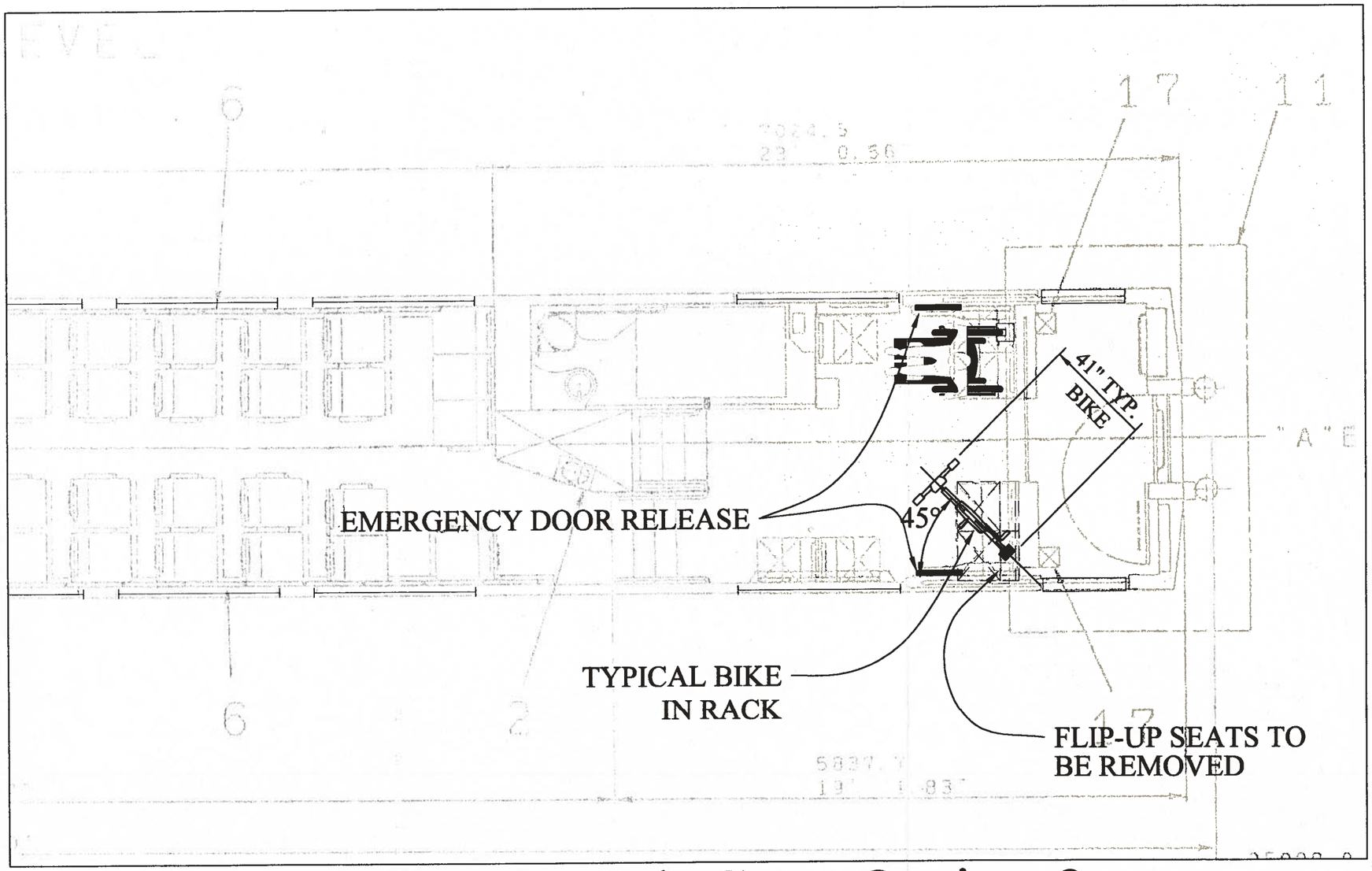


LEGEND

- WHEELCHAIR
- WHEELCHAIR LOCKING DEVICE
- BIKE MOUNTED VERTICALLY
- BIKE MOUNTED HORIZONTALLY
- FLIP-UP SEATS TO BE REMOVED
- SEATS TO BE REMOVED/REPLACED
- BOARDING LOCATION
- EMERGENCY DOOR RELEASE
- CAR WINDOW

# MARC III Cab Car - Option 2

GRAPHIC SCALE

2 0 1 2 4

1 INCH = 4 FT.

**URS Greiner Woodward Clyde**
4 North Park Drive, Suite 200
Hunt Valley, MD 21030
Tel: 410.785.7220

MTA

MARYLAND MASS TRANSIT ADMINISTRATION
ACCOMMODATION OF BICYCLES ON MARC TRAINS
TRANSIT VEHICLE FEASIBILITY STUDY

MARC III Cab Car - Option 2

| DATE: | SCALE: | FIGURE: |
|---|---|---|
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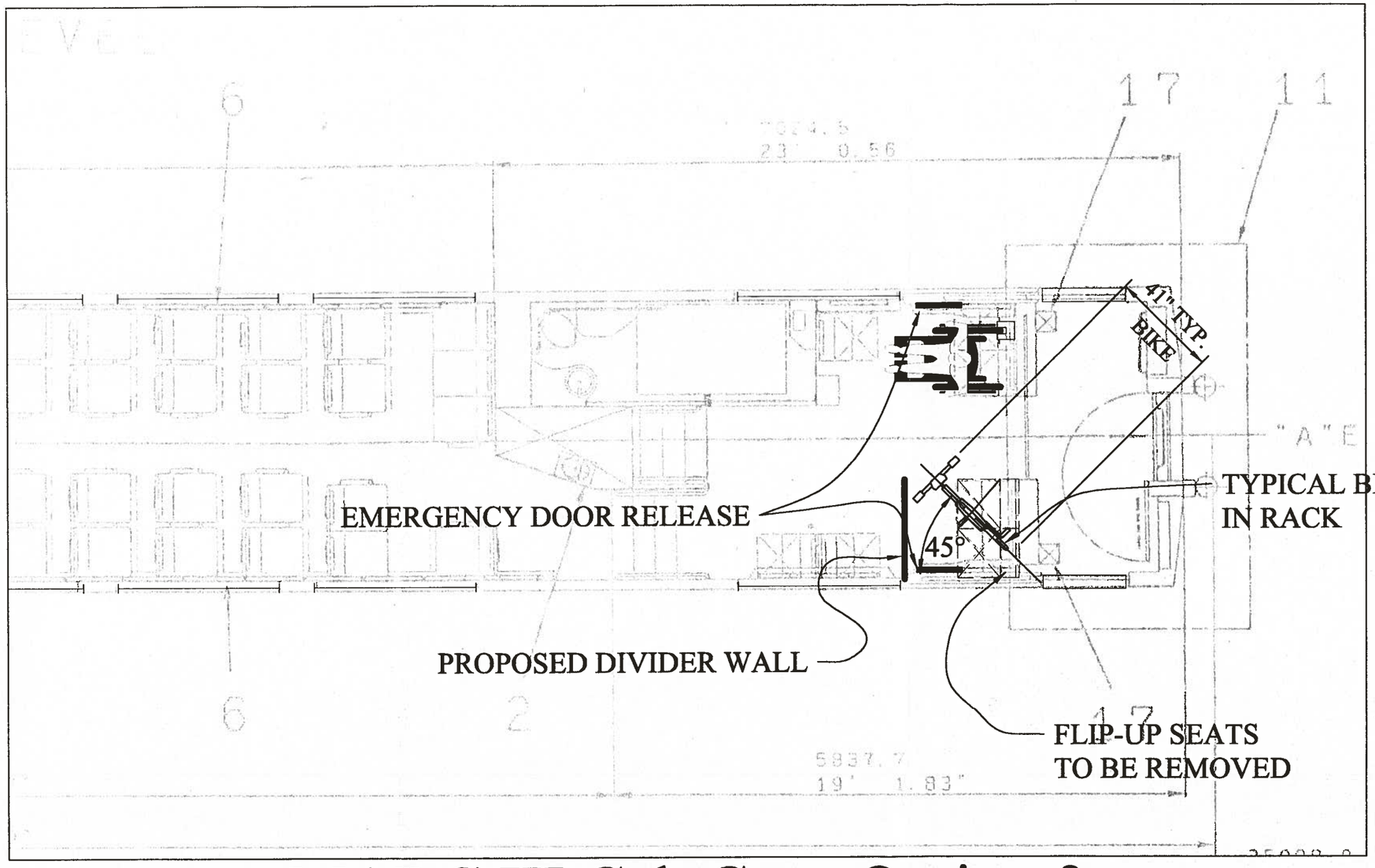


LEGEND

- WHEELCHAIR
- WHEELCHAIR LOCKING DEVICE
- BIKE MOUNTED VERTICALLY
- BIKE MOUNTED HORIZONTALLY
- FLIP-UP SEATS TO BE REMOVED
- SEATS TO BE REMOVED/REPLACED
- BOARDING LOCATION
- EMERGENCY DOOR RELEASE
- CAR WINDOW

# MARC III Cab Car - Option 3

GRAPHIC SCALE

2 0 1 2 4

1 INCH = 4 FT.

**URS Greiner Woodward Clyde**
4 North Park Drive, Suite 200
Hunt Valley, MD 21030
Tel: 410.785.7220

MTA

MARYLAND MASS TRANSIT ADMINISTRATION
ACCOMMODATION OF BICYCLES ON MARC TRAINS
TRANSIT VEHICLE FEASIBILITY STUDY

MARC III Cab Car - Option 3

| DATE: | SCALE: | FIGURE: |
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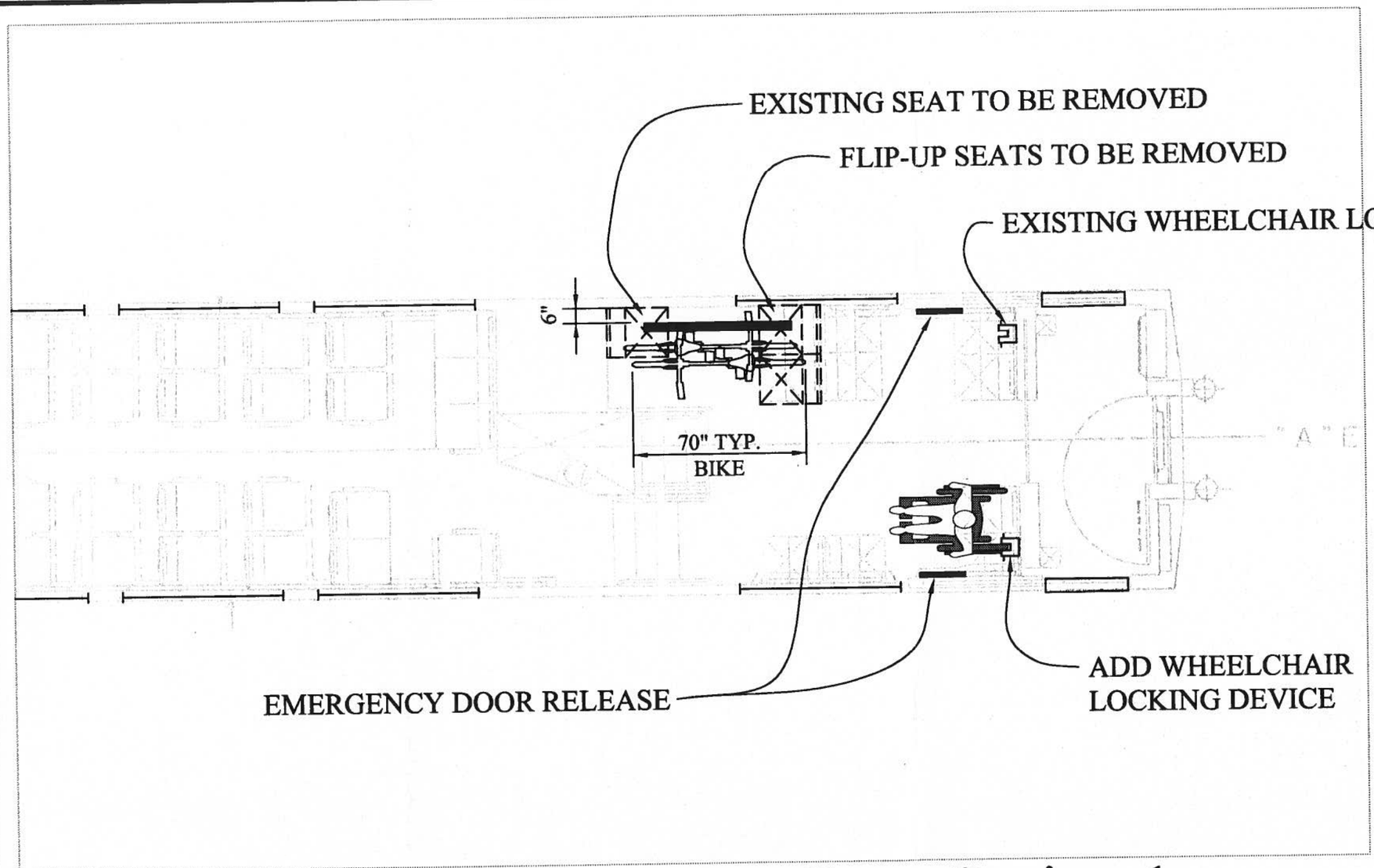


LEGEND

- WHEELCHAIR
- WHEELCHAIR LOCKING DEVICE
- BIKE MOUNTED VERTICALLY
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- FLIP-UP SEATS TO BE REMOVED
- SEATS TO BE REMOVED/REPLACED
- BOARDING LOCATION
- EMERGENCY DOOR RELEASE
- CAR WINDOW

# MARC III Passenger Car - Option 1

GRAPHIC SCALE

2 0 1 2 4

1 INCH = 4 FT.

URS Greiner Woodward Clyde
4 North Park Drive, Suite 200
Hunt Valley, MD 21030
Tel: 410.785.7220

MARYLAND MASS TRANSIT ADMINISTRATION
ACCOMMODATION OF BICYCLES ON MARC TRAINS
TRANSIT VEHICLE FEASIBILITY STUDY

MARC III Passenger Car - Option 1

| DATE: REVISED OCTOBER 2000 | SCALE: 1" = 4'-0" | FIGURE: A-10 |
|---|---|---|

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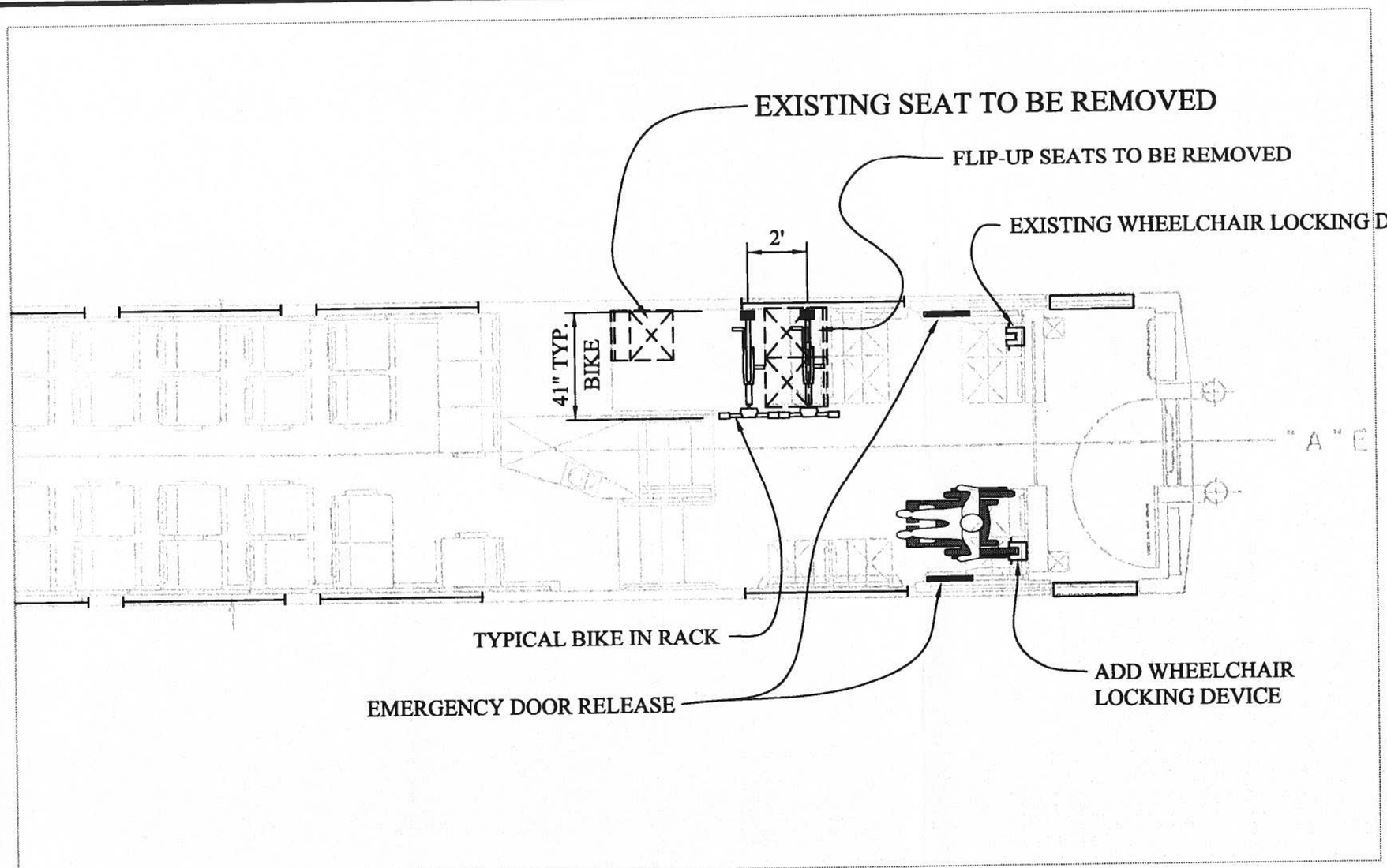


LEGEND

- WHEELCHAIR
- WHEELCHAIR LOCKING DEVICE
- BIKE MOUNTED VERTICALLY
- BIKE MOUNTED HORIZONTALLY
- FLIP-UP SEATS TO BE REMOVED
- SEATS TO BE REMOVED/REPLACED
- BOARDING LOCATION
- EMERGENCY DOOR RELEASE
- CAR WINDOW

# MARC III Passenger Car - Option 2

GRAPHIC SCALE

2 0 1 2 4

1 INCH = 4 FT.

URS Greiner Woodward Clyde
4 North Park Drive, Suite 200
Hunt Valley, MD 21030
Tel: 410.785.7220

MARYLAND MASS TRANSIT ADMINISTRATION
ACCOMMODATION OF BICYCLES ON MARC TRAINS
TRANSIT VEHICLE FEASIBILITY STUDY

MARC III Passenger Car - Option 2

| DATE: REVISED | SCALE: | FIGURE: |
|---|---|---|
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# APPENDIX B

# JUNE 19, 2000 AMTRAK LETTER

June 19, 2000

RECEIVED

MARC TRAIN SERVICE
P.O. BOX 8718
BALTIMORE, MD 21240

Mr. Ira Silverman
Chief Transportation Officer
MARC Train Service
P. O. Box 8718
BWI Airport, MD 21240

Dear Mr. Silverman:

Regarding MARC's proposed bicycle policy, we would expect MARC to publish "Bike" procedures such as during service disruptions, bikers may be required to wait for the next train. Also, what the condition of the bikes must be; no tandem bikes allowed; bike riders will receive no assistance from the train crew, riders must properly secure bikes on board, and the number of bikes an a train may not exceed the number of tie-down locations. The procedures would also identify on which trains bikes may be taken.

Bicycles should not be carried on heavy rush hour trains; however, Trains 401 and 507 can be used to bring bike riders south in the morning from Baltimore and Perryville. Bikes may be carried between Perryville and Baltimore on any trains throughout the day.

The following trains will be available to bicycles: (Southbound) 401, 507, 417, 419, 423, 425, 427 429, 451, 431, 433, 435, and 437. (Northbound) 400, 490, 402, 450, 404, 406, 410, 412, 414, 416, 434, 536, 438.

All stations on the Penn Line can accommodate bicycles with the exceptions of Martin Airport, West Baltimore and Halethorpe. These three stations have minimal platforms and are not felt to be feasible locations to load/unload bikes using step boxes. There are obvious safety issues: uneven surfaces for step boxes; difficulty maneuvering bikes up and down stairways when using step boxes and not holding hand rails; different step heights; and the inability to have an even surface when step boxes are placed in ballast.

Please keep us apprised of your implementation schedule.

Sincerely,

Wade F. Hall
General Manager
Washington Commuter Services

cc: L. C. Davenport J. W. Latchford M. Rose